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The Monthly Review

Published by the AMERICAN ELECTRO-PLATERS' SOCIETY

JANUARY 1938

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The Monthly Review

Published by the AMERICAN ELECTRO-PLATERS' SOCIETY

A Society for the Advancement of the Science of Electro-Plating

JANUARY 1938

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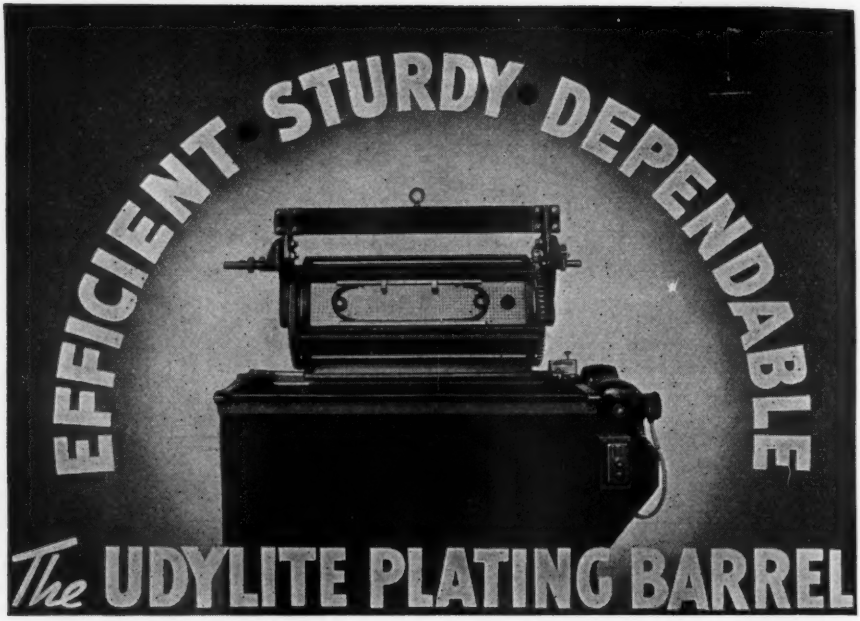

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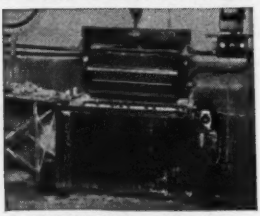

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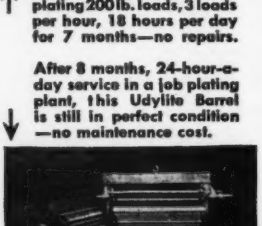

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The MONTHLY REVIEW

Published by the
AMERICAN ELECTRO-PLATERS' SOCIETY

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VOL. XXV JANUARY 1938 NO. 1

Editorial

What do you individually expect from this society? Why did you join it? The answer, of course, is to benefit yourself either through increasing your knowledge or through broadening your acquaintanceship. Therefore, it seems advisable at the present time to bring to your attention two matters which are vitally important to the obtaining of those benefits. One is the matter of advertising in the REVIEW. The other is the matter of increasing our membership.

First, briefly review our finances over the last nine and one-half years. A tabulated summary of these as related to the REVIEW follows:

Year end May 31	Cost of Review	Salaries of Officers	Total	Per Capita Tax	Advertising Sold	Net Worth of Society
1928	$1434.83	$ 250.00	$1684.83	$2648.26		$2422.64
1929	1735.12	250.00	1985.12	2684.19		2642.05
1930	2361.78	250.00	2611.78	3149.28		2362.52
1931	2134.29	250.00	2383.92	2855.36		942.73
1932	2684.23	250.00	2934.23	3238.42		145.80
1933	1160.37*	250.00	1410.37	2863.11		556.50
1934	2652.32	250.00	2902.32	3079.39	2270.20	2062.84
1935	3575.24	250.00	3825.24	2256.77	4023.38	3052.90
1936	4075.61	1052.34**	5127.95	2652.64	3996.83	2506.64
1937	4361.92	1702.80	6064.72	2871.80	5140.82	4262.50
First 6 mos. 1938	2507.92	1280.10	3788.02	1439.17	3717.74	4455.67

These figures seem self-explanatory but in order to avoid any misunderstanding we will explain that the items under "Salaries of Officers" represent the amounts paid to the Secretary-Treasurer and Editor prior to the creating of the office of Executive Secretary and to the Executive Secretary since that time. The column headed "Total" represents the cost of printing and mailing the REVIEW plus the salaries of the officers. The figures given are only those necessary to show the effect paid advertising has had on the finances of the society. The single asterisk (*) indicates the cost of printing the REVIEW as a quarterly. The double asterisk (**) indicates an increase in salaries due partly to additional grants of salary to the Secretary-Treasurer and Editor for work done in previous years.

A study of the above table shows clearly that prior to the acceptance of advertising in the REVIEW approximately 80% of the Per Capita Tax went to pay the cost of printing the REVIEW and the officers' salaries. The figures also show that it is not too early to predict that during the current year the sale of advertising will at least equal these two items of cost, that is, that these costs will not have to be met by the use of any part of the Per Capita Tax. The REVIEW and the Executive Secretary's office are plainly on a self-supporting basis.

By June 1932 our financial condition had become so bad that it was decided to publish the REVIEW as a quarterly rather than as a monthly. This was done over the period of one year. In June 1933 it was decided to again publish the REVIEW as a monthly and to accept advertising as a means of relieving the treasury of this heavy strain. Since that time our financial condition has improved steadily until on Nov. 30th it stood at the highest point in the history of the society. That is what advertising has done for us to date.

However, that is not enough. We do not mean that we are not pleased with what has already been accomplished but that purely from a business standpoint we are not yet on a sufficiently secure financial basis. The way to this assured footing is through more advertising and the way to more advertising lies only through the help of you members.

Our REVIEW while it has numerically speaking a comparatively small circulation goes only to a selected list every man of whom is interested in plating and allied subjects. In contrast to this there are a number of small trade magazines which dealing with plated and related arts are sent out indiscriminately and gratis to a vastly larger number of people a good many of whom never bother to open them. Nevertheless these same papers are able to secure relatively large numbers of advertisers. What does this mean? It means that companies are willing to advertise where they think that they can get returns for their money.

This is where you can help. Remember this is your society and that anything you do toward helping the society is in the direction of helping yourself. There are many additional benefits to be derived by the members from a prosperous society that are impossible from a less prosperous one.

Recently in looking over several periodicals dealing with plating etc. we made a list of about sixty firms selling plating and allied supplies and equipment who advertise in other papers but not in the REVIEW. We need these in the REVIEW. Get them for the REVIEW and we will eventually arrive at a point where the educational benefits from the society to each member will be increased many fold. Look at what other societies have done notably the A.S.M. and the S.A.E. What they have done we can do but only with your help.

It is up to each member to see that every salesman calling upon him realizes that he reads the advertisements in the REVIEW and that he pays attention to them. It is further up to each member to see that the salesman conveys this information to the proper person in his company. That is all you have to do. The rest will take care of itself through our Executive Secretary and you will benefit from it. Let's start now.

In the matter of membership the report at the end of the first six months of the current fiscal year shows that we have obtained 97 new members and suspended 46 members whereas during the previous fiscal year we obtained 268 new members and lost only

38 through suspension. Our record for the current year to date is very disappointing.

Had we gained 97 new members and suspended none our condition would have been most healthy. We would have been able to point with pride to our gain. It would have been a point of interest to our advertisers. It would have helped to convince prospective members that ours is a good organization with which to be affiliated. As it is, it does not look so well.

There are still five months left before the end of our present year. In that time it not only should be but also will be possible to obtain a really substantial increase in our membership if each member will make a reasonable effort to interest those men whom he thinks should be members. The trouble is not that there is a lack of men who should be members but rather that we, ourselves, have done a poor job of "selling" our society. This fact has been brought out rather forcibly to the writer during the past few weeks through meeting several eligible men who did not even know that this society existed. We should see to it that no one remains outside our organization solely because he never heard of it. Remember, individually or collectively, you cannot stand still. You must go forward or you will slip backwards. New members mean progress. New faces mean new ideas and a broadening of our knowledge.

Recent developments have shown that if we will not take men in and give them what they want in the way of knowledge and education that other societies will, even to the extent of encroaching on what is rightfully our territory.

You have a good society. It is one of the most active educationally. It is one to which it is well worth belonging. If each of you, individually, will make up your mind to see what you can do to help we will still end the year with a gain in membership of which we can be proud.

A. B. WILSON, *Pres. of A. E. S.*

Ammonia in Brass Solutions

By L. C. PAN

(Specially written for the Monthly Review of American Electro-Platers' Society)

THE use of ammonia in the brass plating bath to improve the quality of the deposit, especially its color, is almost as old as brass plating itself. In almost every handbook on electroplating, there are formulas of brass plating solutions containing ammonia as one of the ingredients. In commercial plating shops, the beneficial effect of ammonia in brass solutions is almost taken for granted. Yet there are a few questions which sometimes puzzle the electroplater. These questions are: (1) What exactly does ammonia do in a brass plating bath? (2) How does it work chemically? and (3) What is the right amount to maintain in the plating bath in order to secure the desired results? In this connection, some most valuable work has been done by Ferguson and Sturdevant (*Trans. Electrochem. Soc.*, **38**, 190, 1920), who took up the fundamental principles and measurements most helpful with the above questions. The series of experiments described below is the present writer's attempt to add more data on the subject so that these questions might be eventually answered.

Generally, in a study of the exact effect of ammonia upon a brass plating bath, we must take into consideration all the variables that enter into the operation of the bath, such as the amount and ratio of copper and zinc in the electrolyte, free cyanide, carbonate and addition agents in the solution, current density, temperature, etc. The experiments reported in the following were limited to only three of these variables, namely, the copper: zinc ratio in electrolyte, cathode current density and ammonia additions. Observations were made as to color and composition of the brass deposit. Bath voltage, pH value and anode behavior were also observed, but since they were found to be essentially unaffected by ammonia, this part of the data is omitted here.

AMMONIA AND VARYING CURRENT DENSITIES

As a starting point, a solution which has proved satisfactory

for both cold and warm bath, both manual and mechanical operations, was used. It had the following composition:

Brass Solution No. B3

Copper cyanide	4.2 oz./gal.
Zinc cyanide	1.5 " "
Sodium cyanide	6.9 " "
Free sodium cyanide	1.5 " "
Sodium carbonate	4.2 " "

About two gallons of this solution were made with pure chemicals, its composition was checked by analysis and its free cyanide content was adjusted from time to time during the experiments. Each experiment was carried out in one-liter beakers with two anodes, $1\frac{1}{2}''$ x 5", cut from a sheet of "rich low" brass. The cathodes were 1" x 5" strips of polished shim steel, 0.014" thick. The experiments were carried out at room temperature which remained at 21—22° C. throughout the series.

The ammonia was added to the brass solution in the form of 22.4% aqua ammonia so that the baths contained 0.5, 1.5, 3.5, 7.5 and 11.5 cc respectively per liter. For each value of ammonia and for the bath containing no ammonia, a series of platings were made at five different current values corresponding to cathode current densities of 2, 5, 10, 15 and 20 amp./sq.ft. respectively. Each plating was continued for 30 minutes by the stopwatch. After plating the cathode was rinsed and dried in air. Its color was examined. Each brass deposit was analyzed in the following manner:

A piece of exactly one inch square was cut on the shearing machine from the lower middle part of each cathode. The square piece was weighed on the analytical balance; the brass deposit was removed with a mixture of potassium cyanide solution and hydrogen peroxide; the stripped steel piece was rinsed thoroughly, dried and weighed again. The weight of the brass deposit was computed by difference. The copper and zinc content of the deposit was determined by volumetric analysis in the potassium cyanide solution. In all the analyses, the total weight of copper and zinc obtained checked within 0.5 per cent. of weight of deposit in each case. This cross checking eliminated any possibility of errors.

From the weight of copper and zinc in each deposit, the

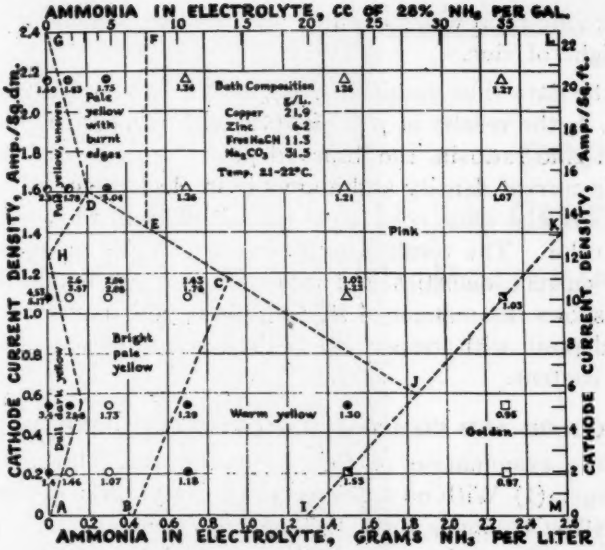


Fig. 1. Color and Composition (Cu: Zn Ratio, as Indicated by Numbers) of Cathode Deposit From a Cyanide Brass Plating Bath Having a Cu: Zn Ratio of 3.54.

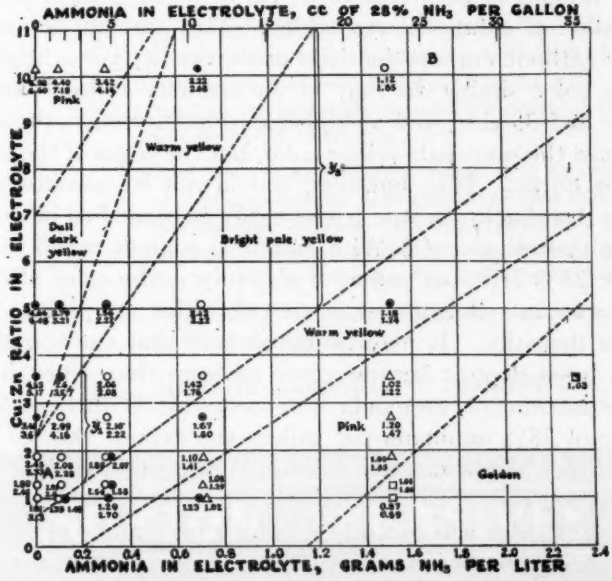


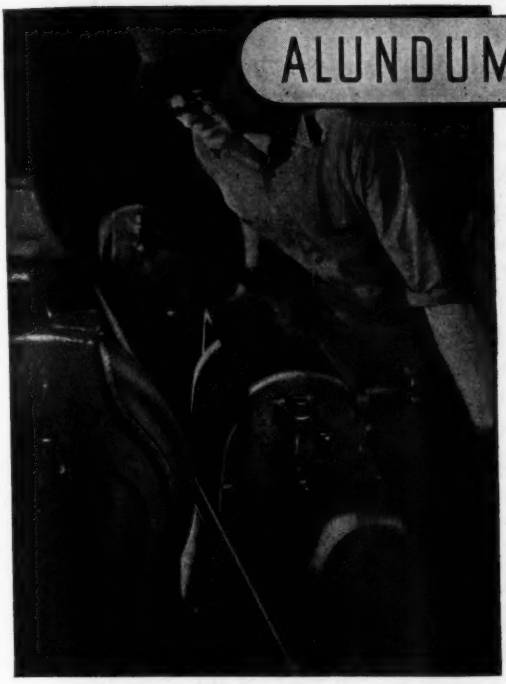
Fig. 2. Color and Composition (Cu: Zn Ratio as Indicated by Numbers) of Cathode Deposits From a Cyanide Brass Plating Bath at 21-22°C. 1.07 Amp./sq. dm. (10 Amp./sq. ft.) and Free Sodium Cyanide 10.5 - 12.75 g./L. (1.4 - 1.7 oz./gal.).

copper: zinc ratio was computed by dividing weight of copper by weight of zinc.

All the data thus obtained were plotted on coordinate paper. In Fig. 1, the results of plating tests with respect to color and copper: zinc ratio in the brass deposit were plotted against cathode current density and ammonia in electrolyte. Then the deposits of the same color were fenced off from those of a different color. The result was a picture of color areas marked off by current densities and ammonia content in electrolyte. Fig. 3 shows the manner of shifting of copper: zinc ratios in the brass deposit with respect to both current density and ammonia content.

COLOR AND COMPOSITION OF BRASS DEPOSITS

A close examination of Fig. 1 showed the following color groupings: (1) With no ammonia in electrolyte, the deposit was dark yellow having a dirty looking appearance at low current densities and streaky, pale yellow at high current densities. (2) The quality of deposit improved, however, as soon as a very small amount of ammonia (3 to 7.5 cc of 28% aqua ammonia per gallon of solution) was added. This amount of ammonia at low cathode current densities made the deposit a bright pale yellow color similar to that of an ordinary rolled brass of 65 copper and 35 zinc, and at higher current densities, the deposit remained the same pale yellow color, but the edges of the cathode became burnt. This, however, should not be considered as a serious drawback, because it can easily be remedied in practical plating operations. (3) With ammonia content raised to 7.5 to 22.5 cc 28% NH_3 per gallon of electrolyte, the color of deposit became warm yellow at low current densities and pink at higher current densities. It may be noted here that the composition of the brass deposit became more uniform than when no, or a smaller amount of, ammonia was used. (4) With from 22.5 to 34.6 cc of 28% ammonia per gallon, the deposit showed a rich golden color at low current densities and a pink color at higher current densities. It is interesting to note that the bright, rich golden color was not due to a high percentage of copper in the deposit. On the contrary, the two most beautiful deposits had the lowest copper content of the entire series, being only 46.5 and 48.7 per cent. respectively, the balance being zinc.



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NORTON ABRASIVES

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This was rather unexpected, because the common rich-low brass which is pale compared to our specimens, is 85% copper and 15% zinc.

CATHODE CURRENT DENSITY AND COMPOSITION OF DEPOSIT

For any brass plating bath containing no ammonia, the copper: zinc ratio in the deposit changes considerably with cathode current density. For the typical bath given above (B3) the ratio changed from 1.5 at 2 amp./sq.ft. to 4.8 at 10 amp./sq.ft. and changed again to 1.8 when cathode current density was further increased to 20 amp./sq.ft. (See Fig. 3). With addition of ammonia to the bath, this change of metal ratio was minimized, and the more ammonia used, the more constant the composition of the brass deposit became. The change disappeared almost completely when ammonia reached 34.6 cc of 28% NH_3 per gallon.

To sum it up, the important point taught by this series of experiments is that ammonia in brass plating bath, produces not only a better-colored deposit, but also a more uniform color and a more uniform composition in the deposit over a wider range of cathode current densities. In view of the fact that in commercial brass plating, the current density is seldom uniform over the object to be plated, the solution that gives a deposit of a satisfactory and steady color and composition over a wide range of cathode current densities, therefore, will be the most desirable solution.

BATHS OF VARIOUS COPPER: ZINC RATIOS

One of the uncertainties about brass plating today is the copper: zinc ratio in the electrolyte. In the first place, there is a difference of opinion as to what value this ratio ought to be. In the second place, all methods of checking up an electrolyte with respect to its metal ratio are rather lengthy and beyond the facilities or conveniences of the greater part of plating shops or departments. According to textbooks on electroplating, this ratio is the all important factor which determines the color and composition of the brass deposit. Other such factors including free cyanide, temperature, current density, etc., are more easily controlled.

Since our first series of experiments with ammonia additions disclosed the remarkable power of small amounts of ammonia of

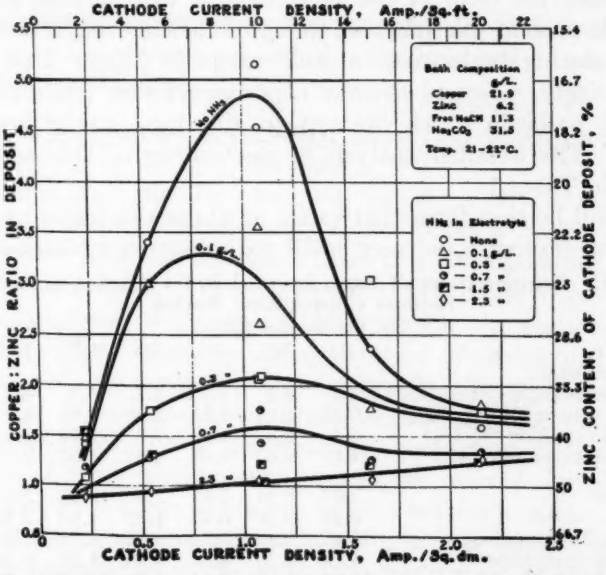

Fig. 3. The Effect of Cathode Current Density and Ammonia in Electrolyte Upon Composition of Cathode Deposits From a Cyanide Brass Plating Bath Having a Cu : Zn Ratio of 3.54.

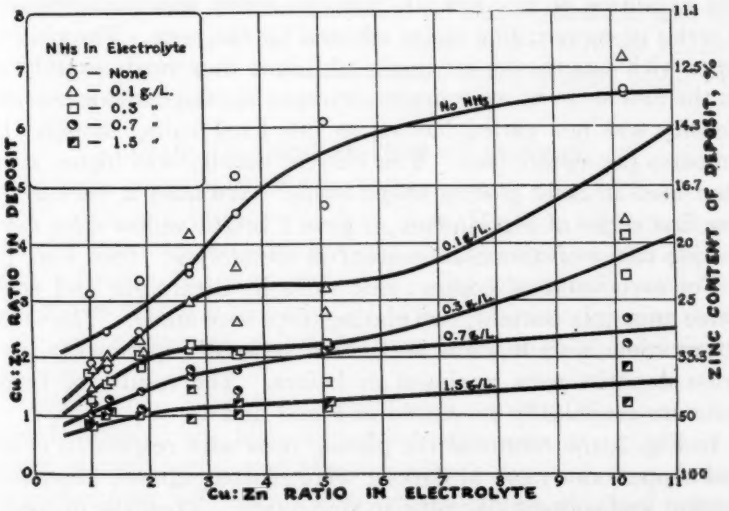

Fig. 4. The Effect of Ammonia and Cu : Zn Ratio in Electrolyte Upon the Composition of Cathode Deposit From a Cyanide Brass Plating Bath, at 21-22°C., 1.07 Amp./sq. dm. (10 Amp./sq. ft.) and Free Sodium Cyanide 10.5 - 12.75 g/L. (1.4 - 1.7 oz./gal.).

equalizing the color of the brass deposit over a wide range of cathode current densities, we thought the same might work with brass plating baths over a wide range of copper: zinc ratios. Accordingly, a second series of experiments were made on brass plating baths in which the copper: zinc ratio varied from 1 to 10.16. The detailed analysis of electrolytes of this series are given in Table 1.

As will be seen from that table, all the seven baths used had identical (except some very small variations) compositions with

Table 1. Compositions of Experimental Brass Plating Solutions of Various Copper:Zinc Ratios
(In ounces per gallon).

Serial No.	B1	B2	B3	B4	B5	B6	B7
Chemicals used:							
Copper cyanide (70.5% Cu)	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Zinc cyanide (54.6% Zn)	0.53	1.07	1.54	2.00	2.94	4.2	5.4
Sodium cyanide (96.2%)	6.6	6.87	6.87	7.0	7.41	7.61	8.13
Sodium carbonate (85.2%)	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Analysis:							
Copper	2.97	2.93	2.92	2.96	2.95	2.97	2.94
Zinc	0.29	0.58	0.83	1.09	1.60	2.30	2.94
Free sodium cyanide	1.40	1.48	1.51	1.70	1.55	1.45	1.56
Sodium carbonate	4.18	4.20	4.20	4.20	4.22	4.25	4.27
Copper:zinc Ratio	10.16	5.08	3.54	2.71	1.85	1.29	1.00
Percentage of copper	91	83.5	78	73	64.9	56.3	50
Percentage of Zinc	9	16.5	22	27	35.1	43.7	50

the exception of zinc cyanide content, which was varied to give a series of copper: zinc ratios selected for the tests. The plating tests with progressive ammonia additions were made exactly as in the first series of experiments, except that the cathode current density was not varied but set at one fixed value, namely, 10 amperes per square foot. This current density was higher than that used in most plating shops today. We used it because in our first series of experiments, it gave a bright yellow color over a wide range of ammonia content in electrolyte. (See Fig. 1).

For each value of copper: zinc ratio in electrolyte and each value ammonia content, two plating tests were made. The same observations were made as in the first series of experiments, and brass deposits were analysed as before. The results of these tests are graphically presented in Fig. 2 and 4.

In Fig. 2, the results of the plating tests with respect to color and copper: zinc ratio in deposit were plotted against ammonia content and copper: zinc ratio in electrolyte. Then the deposits of the same color were fenced off from those of a different color resulting in a series of color zones marked out by straight lines.

Fig. 4 shows the relation between copper: zinc ratio in deposit and that in the electrolyte, and also the influence of ammonia upon this relationship.

COLOR OF BRASS DEPOSITS FROM BATHS OF VARIOUS CU:ZN RATIOS

From Fig. 2, it may be observed that for a certain range of ammonia content in the electrolyte over which a bright yellow brass deposit could be obtained, there is a corresponding range of copper: zinc ratio of the electrolyte. This range of ammonia content progresses as the copper: zinc ratio in the electrolyte is increased. The higher the copper content in the plating bath relative to zinc content, the more ammonia must be present in order that a normal-colored brass deposit may be obtained. This showed clearly that ammonia has the power of correcting the color of brass plating, even though the ratio of copper: zinc in the electrolyte was quite out of the ordinary range. This is important because it means that, if a proper amount of ammonia is maintained in the bath, the metal ratio of that bath may go off quite a long way and still it will produce normal-colored brass deposits.

Another point to be noted is that, the more ammonia was in the electrolyte, the greater was the range of metal ratios in the electrolyte over which a normal-colored brass deposit could be obtained. (Compare y_1 and y_2 in Fig. 2.)

COLOR VE. COMPOSITION OF DEPOSIT

Although a normal-colored brass deposit may be obtained from a bath with any metal ratio from 1 to 10.16 or higher, these normal-colored deposits did not contain the same, or nearly the same, amount of copper and zinc. The copper: zinc ratio in them varied so much as from 1.07 to 4.16. Other deposits that were pink contained anywhere from 50.4 to 87.7 per cent. copper.

Contradictory though it may seem, among the normal-colored deposits, the high-copper deposits came from the low-copper plating baths, and the low-copper deposits were from the high-copper solutions. This unusual result obtained when all conditions were apparently under control, may be explained by the hypothesis that ammonia suppresses the copper-ion concentration in the brass plating bath by forming a complex

probably $CuNH_3(CN)_3^=$, which may be supposed to yield an even lower concentration of Cu^+-ion than $Cu(CN)_3^=$ would yield. This means, there would be much less Cu^+-ions for deposition upon the cathode. On the other hand, zinc is not known to form complexes easily with ammonia, and therefore, zinc ions in the brass solution is relatively unaffected. The result then is that the copper: zinc ratio in the deposit becomes much smaller than that in the plating bath. In the above instance where both ammonia and copper: zinc ratio in electrolyte were increased, the ammonia added removed Cu^+-ions faster than the relative increase of total copper in solution with respect to total zinc. The advantages of a copper-rich solution was more than nullified by the formation of the copper-ammonia complex. Therefore, the copper content of the brass deposit became less and less while we increased both copper and ammonia in the electrolyte.

AMMONIA AS A STABILIZER OF COMPOSITION OF BRASS PLATING

The above point may be presented in another way. If we plot the results of the second series of experiments so that copper: zinc ratio in the brass deposit is plotted against copper: zinc ratio in the electrolyte, we would get a series of curves, one for each value of ammonia in electrolyte, (Fig. 4). We observe that, from baths containing no ammonia, the metal ratio in the deposit follows in a general way the metal ratio in the electrolyte, although the change in the deposit was not as great as the variation in the electrolyte. The most remarkable fact was that by adding about 0.8 oz. of 28% ammonia to each gallon of electrolyte with metal ratios from 1.00 to 10.16 respectively, the range of copper: zinc ratio in the brass deposit narrowed down so much that it appeared almost constant. From practical point of view, this would simplify considerably the problem of maintaining the proper copper: zinc ratio in the electrolyte for brass plating.

SUMMARY

Thus the beneficial effect of ammonia in the brass plating bath has been definitely demonstrated. The results here reported, of course, do not exhaust its possibilities, but among the points so far covered, the following are the most outstanding:

1. Ammonia in a brass plating bath improves the color of

the brass deposit, and the good color may be maintained over a wide range of cathode current densities, and a wide range of copper: zinc ratios in electrolyte.

2. The bright yellow brass deposit produced with the aid of ammonia from various baths under various conditions, do not have the same composition, the latter is influenced by the amount of ammonia, the metal ratio in the electrolyte, and cathode current density.

3. Ammonia in brass plating bath minimizes the effect of cathode current density, and metal ratio in electrolyte upon the composition of the deposit.

October 13, 1937
Shanghai, China.

The Bullard-Dunn Process

By MR. T. H. WILBUR
of the Bullard Co.

Read at Bridgeport Branch Meeting December 3, 1937

THIS is the only method of descaling that will remove scale and oxide without damaging the basis metal. It has a particular application in the plating industry because it assures complete scale and oxide removal.

The equipment used is similar to that used for electroplating both for manual and automatic operation. A new type of conveyor, the Bullard Station Type Conveyor, an automatic, rotary, hydraulically operated machine was described.

The speaker described the treatments of degreasing, descaling and defilming, explaining in detail when each treatment is used, the make-up of the solutions in each case and the conditions of operation. In connection with the descaling bath he described the action of the silicon alloy anodes and how they stabilize the operating characteristics of the bath. For plating he explained that the number of dips were fewer than often used when other cleaning methods are employed.

The speaker described the outstanding characteristics of the process. For example, it does not etch, it possesses high throwing power, it operates uniformly with respect to cleaning time, the solution life is long. The solution can be operated indefinitely without dumping. No permanent embrittlement

results. The metal film deposited in the descaling treatment offers a protection against corrosion sufficient for dry storage purposes and also sufficient to protect work, such as gears, as they pass to subsequent manufacturing processes. Racks are protected by the same metal film which protects the work and, therefore, rack depreciation is low.

Some of the commercial applications for which the process is being used were mentioned. These are listed below.

1. To remove scale where no dimensional change can be tolerated. Dies, rubber molds, gears.
2. To remove scale from recesses difficult or often impossible to reach by other methods, where complete descaling is essential. Diesel engine nozzles, oil pipes for aviation engines.
3. To remove scale before grinding to reduce grinding costs. Heat treated parts of all kinds in automotive, aviation, tractor, pump machinery, machine tool industries.
4. To remove scale and use metal deposit for appearance and protective qualities. Rock bits, formerly cleaned and plated with cadmium, two separate operations, are now descaled and coated with tin in one operation.
5. To prepare surfaces for application of protective coatings, as for example, electroplating, Parkerizing, japanning, hot tinning. One of the large electrical companies has adopted the process after a thorough trial to clean work prior to electroplating, the result being a distinct improvement in the character of the plated coatings and a marked reduction in spoilage.
6. To remove scale prior to welding. The radio industry is using the process in the manufacture of metal radio tubes and, as a result, a superior quality of weld is made possible.

The speaker declared that electrolytic descaling is rapidly displacing unelectrified pickling on account of its faster cleaning characteristics. A graph was exhibited which showed the effect of temperature and current density on cleaning time.

Samples of various kinds were exhibited during the evening to illustrate the applications for which the Bullard-Dunn Process is being used.

Steel *for* Plating Purposes

By
FREDERICK FULFORTH

Read at Philadelphia Branch Meeting

In the writer's position and in contacts as consultant to various firms, one of the ever-recurring problems for low costs and fine plated finish on steel can be traced to improper specifications — or to improper press shop methods.

Several years ago it would have been impossible to do with strip steel what the plater is doing today, but such vast forward strides have been made by rolling mills that it is now possible to consistently procure steel which is of a specification so that no polishing is required previous to plating, even when considerable working is necessary in the manufacture of the part; and there is no reason why all platers should not know this and understand how to order steel for the utilization of these advantages.

In the first place, if you have to order steel on a price-per-pound basis do not bother to finish the next paragraph but if open for conviction consider a common round flanged lid of .037″ strip stock weighing, when finished, one pound.

If cheap cold rolled strip is used for this purpose, the cost of material is probably in the neighborhood of 3½ to 4 cents and press operations of combination blank and form followed by trim and then punch would approximate six dollars per thousand or 6/10 of a cent, each. Now with this grade of stock you will find it necessary to polish all over the piece for not less than 3 cents, based on the polisher earning $1.00 per hour. In nickel plating, you will require a good .001″ of nickel in order to give the buffer plenty of material to cover the remaining polishing scratches, which buffing will run a minimum of 1½ cents on the same hourly basis as the polisher.

Adding all together you have a total material and direct labor cost of:—

Material	.035
Press Operations	.006
Polishing	.030
Buffing	.015
TOTAL	.086

Now instead of buying 3 to 4 cent stock, let us buy the best cold rolled strip stock procurable to your specifications properly boxed, papered and inspected which will cost about $6\frac{3}{4}$ cents per pound.

Instead of rushing through the press shop let us handle the operations a little more carefully and spend more time on the dies to keep out die marks, slugs, handling scratches, etc., and pay 8/10 cent per piece instead of 6/10 cent.

By doing these two things you entirely eliminate the polishing and reduce the cost of buffing from .015 to .01, to say nothing of having to only give .00075″ of nickel thickness since the extra .00025″ was only lost in trying to cover up marks left by the polisher so that we now have:—

Material	.0625
Polishing	None
Press Operations	.0080
Buffing	.0100
TOTAL	.0805

not including the saving on nickel as metal and its plating time. Also, for simple illustration, all overhead has been omitted which when figured would show an appreciably higher saving.

This is an actual CONSERVATIVE case and not a New Deal Theory, so if you are convinced of the possibilities suppose you continue to the actual specifications which are six in number.

I — FINISH

This should be specified as No. 3 cold rolled strip steel of proper gauge, width and in multiples of the length required to make one piece. The No. 3 means to the mill a finish free from handling marks, scratches, rolled shear edges, dents, dirt and anything which would require polishing to remove a blemish of any kind, and most important of all, a certain degree of brightness given by the last cold pass which is better for plating than anything short of buffing with stainless steel compound. The multiples of the length of one piece, although an extra, will more than pay for itself in scrap savings and obviation of the necessity for rehandling to shear.

II — OILING

This specifies the use of an oil or grease preferably of lanolin base or any other 100% saponifiable composition which will not dry out or shrink during storage. If the proper type is used, no further lubrication will be required for the usual blanking, forming, punching and bending press operations; another small saving.

III — PAPERING

Each sheet must be separated by a special sulphate type paper free from chemicals tending to attack the steel or solid impurities embedded therein which might mar or scratch.

This paper is retained throughout blanking, punching, bending and some drawing operations in the press shop, and more than pays for itself in the handling scratches and die marks eliminated by its use.

It must not be so porous as to absorb all the oil on the surface of the sheet, leaving the steel to rust, but it must be sufficiently porous on its surface to adhere intimately to the oily stock surface and must be flat and smooth on the sheet to avoid wrinkling which would leave a mark on the stock under pressure.

The paper must cover the entire strip neither overhanging sides or ends nor being narrower than the strip itself.

IV — BOXING

The strips must be boxed in convenient handling weights not to exceed say 500 lbs. and so held therein that no detrimental motion can occur in handling or shipment. The boxes must be bound and nailed securely for the same reasons and be of sufficient thickness of wood to stand all reasonable handling without breakage. The gauge, width and length of stock and the net and tare weights must be plainly stenciled on top along with a notation saying, "best side up," which packing must be satisfactorily seen to by the rolling mill shipping inspector. Also, the net weight must be plainly stamped on one end of the box so that when piled the total weight may be computed without moving all boxes by reading the ends.

In use, the top of the box must always be opened and the stock kept with the best side up with its paper thereon throughout the press operations in order to keep the best side for the finish side.

V — TEMPER

This is best determined by agreement with the mill after a sample piece or a drawing have been submitted to them, but from the writer's experience a "B" Rockwell of 45 to 55 will take care of all ordinary press shop operations satisfactorily and the low side is preferable since if the stock is to be stored for any length of time it is subject to an age hardening process which may go as high as five points. In general the closer the hardness is held to 48, the better the bending and medium drawing qualities will be, provided the mill has selected the properly cropped billets of the correct carbon and other constituent content.

VI — GRAIN SIZE

This subject is not so well known or understood either by the platers or the mills in its relation to finish, but in general the finer the grain size for any given hardness the better looking bends and draws will be in the finished product. There are so many arbitrary number and size nomenclatures used by various mills that any specifications here would be misleading, and again the best procedure in this case, as in V, is to have the mill guarantee to deliver a grain size compatible with their hardness which will make the bends and draws required by your sample or drawing free from egg shell, orange peel or breaks of any kind and if time permits they should submit samples for trial on your dies before rolling the whole shipment, at which time you may make or have made your own microscopic grain size count and see that future shipments adhere to the original specifications therefor.

No amount of good steel can be profitably used without the correct methods to process it but the scope of this paper will not permit investigation along these lines.

It would be improper to close this writing without giving full credit to Mr. George B. Hogaboom for his original arousing of enthusiasm in the writer toward solving some of the reasons for steel failure, some six or seven years ago and also to Mr. George B. Whitehead, the immediate superior whose patience and invaluable suggestions have done much to secure the rolling mill co-operation.

Removal of Carbonate *from* Cyanide Plating Solutions *by* Gypsum

By R. O. HULL
Research Chemist,
E. I du Pont de Nemours & Co.,
Grasselli Chemical Dept., Cleveland, Ohio
Read at the New York Convention, 1937

ONE of the results of the operation of cyanide plating solutions is the inevitable tendency toward accumulation or "building up" of sodium carbonate in the solution. The sources of carbonate are absorption of carbon dioxide from the air and decomposition and oxidation of sodium cyanide upon operation of the solution. The first of these takes place according to the following reaction:

$$2NaOH + CO_2 \longrightarrow Na_2CO_3 + H_2O$$

The second source of carbonate, that of decomposition of cyanide, results in the formation of ammonia and also the intermediate formation of salts of formic acid. These reactions are as follows:

(1)

$$2NaCN + 2H_2O + 2NaOH + O_2 \longrightarrow 2Na_2CO_3 + 2NH_3.$$

or

$$NaCN + 2H_2O \longrightarrow HCOONa + NH_3$$
$$2HCOONa + O_2 \longrightarrow Na_2CO_3 + CO_2 + H_2O.$$
$$2NaCN + H_2O + CO_2 \longrightarrow Na_2CO_3 + 2HCN.$$
$$2HCN + 4H_2O \longrightarrow 2HCOOH + 2NH_3.$$

etc.

The accumulation of sodium carbonate in solution has various deleterious effects, such as markedly lowering the bright current density range in cadmium solutions in amounts above 5-6 oz/gal. and decreasing cathode efficiencies of copper and brass solutions above 12 oz./gal.(2) It is therefore essential that this substance be removed from solutions at regular intervals to insure their continuously satisfactory operation.

FORMER METHODS

Various methods have been proposed in the past to remove sodium carbonate from solution, of which may be mentioned precipitation with barium cyanide(3) or barium chloride,(1)

(1) Blum and Hogaboom "Principles of Electroplating and Electroforming," 2nd Ed., pg. 227.
(2) Metal Industry, Vol. 35, No. 2, 1937, pg. 64 — George B. Hogaboom.
(3) Metal Industry, Vol. 12, No. 1, 1914, pp. 4-5 — George B. Hogaboom.

or by "freezing out".([3]) The disadvantages of the first two are the high cost of barium salts and the production by metathesis of either free sodium cyanide or sodium chloride. Excess of sodium cyanide may upset the solution balance, and consequently the first is undesirable. Sodium chloride is definitely harmful because of its tendency in cyanide solutions to accelerate the corrosion of iron, commonly used as a tank material. The "freezing out" method is to be preferred to the others, but it is only capable of application in cold weather, or with extreme difficulty in warm weather, and further, is only efficient, according to Hogaboom, in reducing the sodium carbonate in excess of 8.5 to 10 oz/gal. If this is not conducted carefully, there is danger of freezing out of metal cyanides. The sodium carbonate in the solution, even in this amount, may be harmful, as is known to be the case in cadmium. In addition, if the solution has an initial sodium carbonate content of this amount, it is probable that a relatively short period of operation will result in its accumulation to a harmful concentration. Hogaboom([2]) described in detail experiments made upon the "freezing out" method, but the only way in which the sodium carbonate could be reduced to below 8.5-10 oz/gal was by concentration of the plating solution, which is not practical.

PROPOSED METHOD

The most practical means for removal of carbonate would seem to be precipitation by means of a suitable compound to form an insoluble carbonate. It is apparent that the metal carbonate must be the least soluble of the salts that may be formed, else the least soluble compound will precipitate in preference to any other. Also, it is quite essential that the soluble salt formed by double decomposition or metathetical reaction be either inert or beneficial. Of the elements that may be applicable, those of the alkaline earth group, calcium, barium and strontium, are characterized by a low solubility of the respective carbonates. Barium has already been considered. Strontium could be used either as the cyanide, chloride or sulfate, but all are open to the previous objection of high cost. The use of calcium was therefore considered as the most desirable, both from the standpoint of cost, availability and applicability in its chemical behavior to the problem at hand.

As a result of the above, all of the commonly available compounds of calcium were considered, including slaked lime (calcium hydroxide), calcium cyanide and calcium sulfate or gypsum ($CaSO_4.2H_2O$). The use of the first two is objectionable since either free caustic or cyanide is formed, and further, calcium cyanide is not only costly and relatively impure, but is exceedingly dangerous to handle because of its tendency to liberate free hydrocyanic acid gas upon exposure to the air.

Calcium sulfate or gypsum was decided upon as an ideal material to be used, since it is available in a high degree of purity and at low cost. Two advantages present themselves in the use of this material as a result of its relatively slight solubility. The slight solubility diminishes the introduction of deleterious impurities, and it can be maintained in excess at all times, permitting continuous removal of carbonate as soon as it is formed. This material, although slightly soluble in water, is 40 times as soluble as calcium carbonate; and calcium hydroxide, which is the only other substance that could be precipitated, is 30 times as soluble as calcium carbonate, as is shown in Table No. 1.

Table No. 1

	Solubility per liter Solution at 25° C. (4)
Calcium Sulfate ($CaSO_4.2H_2O$)	2.08 g. $CaSO_4$.
Calcium Carbonate ($CaCO_3$)	.056 g. $CaCO_3$.
Calcium Hydroxide $Ca(OH)_2$.	1.59 g. $Ca(OH)_2$.

Since it is an established law that a system to be in equilibrium must reduce to the least soluble compounds, the result is that the calcium sulfate slowly dissolves and immediately upon solution precipitates calcium carbonate. This process is continuous until all of the carbonate is precipitated as calcium carbonate. By metathesis, sodium sulfate is simultaneously formed, but this is not deleterious to the operation of cyanide solutions, and in fact is of value as a conducting salt. This reaction is as follows:

$$Na_2CO_3 + CaSO_4.2H_2O \longrightarrow Na_2SO_4 + CaCO_3 + 2H_2O$$

If desired, the soluble sulfate formed can readily be crystallized out at $Na_2SO_4.10\ H_2O$ (Glaubers Salts) by cooling with ice. The solubility of this substance is shown in Table No. 2.

Table No. 2

Solubility of Sodium Sulfate, Na_2SO_4. (4)

Temp. ° C.	Na_2SO_4 g./100 g. sol'n.	Na_2SO_4 g./100 g. water
0	4.76	5.0
5	6.0	6.4
10	8.3	9.0
15	11.8	13.4
20	16.3	19.4
25	21.9	28.0

From the above table, it is apparent that cooling to 10° C. (50° F.) with ice will reduce the sodium sulfate to about 80 g./L. (10.7 oz./gal.), or to 5° C. (41° F.) to 60 g./L. (8 oz./gal.). The sodium sulfate need not, however, be removed since it is of no detriment in most cases.

EXPERIMENTAL

Laboratory and commercial tests were made on the precipitation method of carbonate removal, using cyanide solutions of cadmium, zinc, copper, and silver. With respect to the latter, it may be noted that while silver sulfate is only slightly soluble in water, it is easily soluble in cyanide solutions and is therefore not precipitated.

CADMIUM TESTS

A test in the laboratory was made upon a cadmium solution of the following composition:

	g./L.	*oz./gal.*
CdO	43	5.7
NaCN	130	17.4
Na_2SO_4	58	7.7

Anhydrous sodium carbonate was added in the amount of 75 g./L. (10 oz./gal.). The solution was then agitated with 120 g./L. (16 oz./gal.) calcium sulfate ($CaSO_4.2H_2O$ C.P.). Analyses were taken after various intervals of time of stirring with results as follows:

Time of Stirring	*Na_2CO_3*	
	g./L.	*oz./gal.*
0.	72.5	9.6
15 min.	6.4	.85
1½ hrs.	5.4	.72
28 hrs.	3.0	.40

(4) From Seidell's "Solubilities of Inorganic and Organic Compounds," 2nd Ed.

A commercial trial was made on a solution high in carbonate, having the following analysis:

	g./L.	oz./gal.
CdO	3.75	.5
NaCN	41.2	5.5
Na_2CO_3	61.5	8.2

Ground gypsum of commercial grade was added in the amount of 75 lbs. to 75 gallons of this solution, equivalent to 11 pounds in excess of that sufficient to precipitate all of the carbonate. After one hour's agitation with a garden hoe, the solution was again analyzed, and the sodium carbonate was found to be reduced to the low value of 12.5 g./L. (1.64 oz./gal.).

SOLUTIONS OTHER THAN CADMIUM

To check the application to other solutions, laboratory tests were made on cyanide solutions of zinc, copper, and silver. These solutions were agitated for 15 minutes with the calculated amount of commercial ground gypsum, and the following results obtained:

	Solution Analysis for Carbonate				*Amount* $CaSO_4.2H_2O$		*Analysis for Silver*	
	Before		*After*		*Used*		*Before*	*After*
	g./L.	oz./gal.	g./L.	oz./gal.	g./L.	oz./gal.	g./L.	g./L.
Zinc	77.6	10.3	9.7	1.3	129	17		
Copper	69.5	9.3	1.6	.21	113	15		
Silver	79.2	10.5	1.6	.21	129	17	22.7	23.3

SUMMARY

It is obvious that the method may be extended to brass solutions, which are mixtures of copper and zinc cyanide.

RECOMMENDED PROCEDURE

The procedure for removal of carbonate is first to determine the concentration of sodium carbonate in solution and the amount that must be removed, expressed in ounces per gallon. Stoichiometrically, the amount of hydrated, ground gypsum required is 1.6 times (by weight) the amount of sodium carbonate. Therefore, for every ounce per gallon of sodium carbonate to be removed, 1.6 ounces per gallon or 10 pounds of gypsum are added per 100 gallons of solution and agitated thoroughly with a hoe or mechanically for at least one hour.

The precipitated calcium carbonate may be shoveled out after settling, the supernatent liquid decanted or syphoned into another tank, or the solution filtered. The calcium carbonate traps some plating solution especially if the first two methods are used. This may be recovered by dumping the calcium carbonate into a crock of clean water, allowing to settle, and the resulting liquid used for makeup.

As mentioned above, the sodium sulfate may be crystallized from solution after the carbonate is precipitated. This should be done after separation of carbonate. To crystallize the sodium sulphate from a solution at a temperature of 70° F., about 150 pounds of ice per 100 gallons of solution should be used or the solution cooled to 50° F. by other means. To induce crystallization it may be necessary to add a crystal of sodium sulphate or Glaubers Salts to the solution.

If it is desired to keep a solution free from carbonate at all times, gypsum may be added in excess and allowed to remain on the bottom. This will be nearly insoluble, but will precipitate any sodium carbonate as formed in the solution.

It should be emphasized that only gypsum of high purity and known analysis be used, ground sufficiently fine to act rapidly in the solution.

CONCLUSION

It is a known fact that many hundreds of gallons of cyanide solutions are discarded annually because of excessive carbonate formation and therefore the adoption of the method above described should prove of considerable value in the recovery of a large proportion of this waste.

CHAIRMAN SMITH: Gentlemen, Mr. Hull's paper is open for discussion.

DELEGATE WOOD: Not having had any experience with sulphate and silver solution myself, I would like to ask how you determine that sulphate is less objectionable than carbonate in the solution?

MR. MACAHAN: I do not know. Inasmuch as I cannot answer the question, perhaps there is someone here who can. How about Mr. Strausser?

MR. HULL: In answer to Mr. Wood's question, I would say that we have not had any direct experience with silver. We have, however, had direct experience with copper and cadmium

and zinc, and in all three of these cases we have found that carbonate is much more harmful than the sulphate.

MR. HOGABOOM: May I ask what effect sodium sulphate would have if used in a steel tank?

MR. HULL: No effect whatsoever has been observed.

MR. HOGABOOM: May I ask that Mr. Hull give us some figures on how he knows that sodium sulphate is not detrimental to the anode and cathode efficiency, and the effect on the character of deposit?

MR. HULL: Especially in cadmium and zinc solutions, we know for a fact that the sulphate has no effect on either cathode or anode efficiency in a concentration up to eight or ten ounces, but carbonate we do know is detrimental to appearance of deposit above six ounces per gallon.

MR. HALL: Have you found this excess of gypsum to have any result as far as smoothness of the deposit goes?

MR. HULL: That, of course, will depend upon the conditions of operation. For ordinary deposits of cadmium or zinc or copper up to three or four ten-thousandths, precipitates of this nature do not enter into the picture.

MR. HOGABOOM: What effect has the addition of sodium sulphate upon the free cyanide content?

MR. HULL: It would have no effect upon it.

MR. HOGABOOM: It would reduce it.

MR. HULL: I do not see how it could.

DR. BLUM: Whether you remove carbonate from solutions with a suitable cyanide, hydroxide, or sulphate, the formation of equivalent amounts of corresponding sodium compounds will always result.

In the last number of "Metal Industry" Mr. Hogaboom had some correspondence regarding the use of barium hydroxide.

I want to show how far-reaching is this statement of Mr. Hull. I have no information as to the effect of sodium sulphate in the cyanide plating solutions. If what he says is true, there is no use in buying any metal cyanide; you might just as well make your baths with zinc sulphate or with copper sulphate, as the amounts of sodium sulphate that would form in the beginning would be very much less than the ten ounces per gallon that Mr. Hull spoke about. This is a much more far-reaching conclusion than simply the removal of carbonate from solutions. More

study of all of these cyanide solutions might show that many of these salts, just as Mr. Wood pointed out tonight, may be beneficial in some cases, and not necessarily detrimental.

DELEGATE WOOD: Mr. Hull, do I understand that calcium sulphate is soluble in ordinary solution?

MR. HULL: Yes, slightly.

DELEGATE WOOD: Then it would be reasonable to suppose that even though you had it in a solid form at the bottom of your tank there would be a small concentration of calcium in the solution?

MR. HULL: Yes.

DELEGATE WOOD: If that is the case, you could expect decomposition of cyanide to result. I have made some experiments using excessive calcium carbonate and found very detrimental results due to the roughing of the deposit by such calcium carbonate. Incidentally, this is the solution with the calcium nitrate and I found it very detrimental to have an excess of a calcium salt in the solution, as I mentioned in my paper.

MR. HULL: Of course, calcium nitrate would have undoubtedly quite a different effect than calcium sulphate. Nitrate is an oxidizing agent. On the other hand, sulphate is not an oxidizing agent and, therefore, would be expected to have a quite different effect, especially as calcium sulphate is only soluble in a neutral solution to the extent of two grams per liter.

MR. HOGABOOM: If that is advantageous to run a solution at a certain pH and you should lower it with the sodium sulphate, what would you add to bring it back?

MR. HULL: I would not expect that sodium sulphate would change the pH. Has it been found to do that?

MR. HALL: You are substituting sodium sulphate for sodium carbonate. The equilibrium of sodium sulphate is lower.

MR. HULL: But the pH of the sodium sulphate solution is very nearly neutral.

MR. PROMISEL: I can confirm what Mr. Wood has said about the danger of having insoluble fine precipitates in the solution. A few years ago, we used sodium sulphate, but we had such dif-

ficulty with the insolubles in the solution that the deposit was poor for quite a period due to the possible detrimental action of sulphate. I say the following with some hesitation, because the few experiments were rather sketchy and it was some years ago, but I think there is quite a definite danger that sodium sulphate, at least in large quantities, does adversely affect the appearance of the deposit and also some of the electro-chemical characteristics, as in the case of silver-plating solutions.

MR. HULL: As I stated before, we have had no direct experience with silver-plating solutions other than to determine whether or not the method would work, and to note briefly the effect of sulphate on the appearance of the deposit.

Calcium carbonate, however, is quite readily filtered, or one need not even filter it. All that is necessary is to allow it to settle and then siphon off the upper layer of liquid and discard the calcium carbonate or recover the solution from the precipitate by dilution with water.

MR. SCHREUR: To go back to this question of pH again, I believe you stated that you operated a bath with an excess of calcium sulphate. Did you take care of any carbonate that was formed?

MR. HULL: That may be done. We have found that calcium sulphate, if you are not trying to produce heavy metal deposits, is of no harm to the deposit. If the deposit is less than five ten-thousandths, the calcium sulphate would not have any effect upon its smoothness.

MR. SCHREUR: Well, now, you are going to have iron in that solution. Is it not conceivable that due to the soluble calcium the iron which is present will be lower than it would be otherwise?

MR. HULL: That would not be expected in a concentration of only two grams per liter.

MR. SCHREUR: Calcium sulphate itself would have a slightly different pH. It should be more acid than the sodium sulphate, but in the extent of two grams per liter, I do not think it would affect the pH appreciably.

DELEGATE WOOD: My point a moment ago on the insoluble material, which I thought might be detrimental, was that by having an excess of calcium sulphate you would have virtually

a constant precipitation of calcium carbonate which would be detrimental. Also we should mention the possibility that the removal of carbonate might increase the rate of decomposition of cyanide, and I think this point is a possibility.

MR. HULL: The relative rate of decomposition of cyanide in the presence of calcium sulphate would have to be studied. I cannot see that it would be expected that neutral sulphate or any inert salt, such as sulphate, would have any great effect upon the decomposition of cyanide.

DELEGATE WOOD: You remember a few years ago that Dr. Wick pointed out that this addition of small concentration of caustic to a cyanide solution would decrease the rate of decomposition. I believe that in the decomposition of cyanide, HCN was volatilized and the caustic was inclined to prevent that. In this method where you are removing carbonate as fast as it is formed, I think the opposite tendency might be possible.

MR. HULL: A very logical explanation of Dr. Wick's statement is the fact that sodium hydroxide solution will become carbonated or turn into sodium carbonate. Therefore, it will be expected that a cyanide solution containing free caustic soda (but not necessarily carbonate) will perhaps have a lesser tendency toward decomposition of cyanide than in its absence because of the above fact.

MR. HOGABOOM: It would be very interesting and most valuable if you found that sodium sulphate could be used in the solution and give the same results as the carbonate is now giving in the lower range. That would probably be in line with the early work. If you will take some of the real old books like Langebein's first, second, and third editions, you will see that they used sulphate and left them neutral. Many of the copper and brass and zinc solutions were made with the sulphate salt as Dr. Blum said and they had good results. One of the best brass solutions that the late Dad Liscomb used was made entirely from sulphate, and he used to think that was the best brass solution that ever was brought out. If this goes back to that and you find your interesting and valuable experiment to prove that the sodium sulphate will give equally as good results as sodium cyanide, you have done a fine job.

A Discussion *on* Barrel Electroplating

By PHILADELPHIA BRANCH

Read at the New York Convention 1937 by Mr. Joseph Underwood

THE first subject discussed was nickel plating. It was surprising to learn of the actions of some chemicals in the bath. The metal was added in the form of nickel sulphate. Boric acid, it is understood, acts as a buffer. Chloride was then discussed and there was much difference of opinion in what form chloride should be added; some members used nickel chloride, others sodium or ammonium chloride. Many present felt that sodium caused a brown stain on the work, and that ammonium was the best form to add chloride as the ammonium combined with the free acid in the bath to form ammonium sulphate, which in some way was beneficial to the bath, helping, perhaps, to make a more ductile nickel and also a whiter deposit.

An interesting fact was brought to light regarding ammonium in the nickel bath. A solution was made up from single nickel salt, boric acid and nickel chloride. A greenish substance that looked like nickel sulphate was deposited at the cathode, but when ammonia or ammonium salt was added a good white deposit of nickel was obtained. Many present felt that there was much research work yet to be done on nickel plating, particularly with reference to the action of ammonia and the proper type of a chloride salt to add to the solution.

Bright plating in a barrel was discussed briefly, and the feeling was general that there was still room for improvement in this type of solution. Many types of solution are in use in the Philadelphia area, but it was generally agreed that the best all-around solution was as follows: Single nickel salt sixteen ounces, boric acid three ounces, ammonium chloride three ounces, pH of 5.8 using ammonia to correct the pH.

COPPER PLATING

Cyanide copper plating was the next subject taken up, and here again we found a wide difference of opinion was in evidence. One member used two ounces of free cyanide with copper solution and had no trouble. Another plater, using the same type solution, found that when the parts were burnished after plating that the deposit raised in spots from the base metal, but by the addition of one ounce of free cyanide, to make the total free cyanide three ounces per gallon, that the trouble was overcome, and oxidizing the copper plated surface plated from the solution with the high cyanide content seemed to work much better and there were fewer rejections when the higher cyanide content was used.

Carbonates also came in for discussion, and it seems that most platers used from two to three ounces per gallon for sodium carbonate when making up a bath, and then simply don't bother further about that. The addition of rochelle salt was again discussed, and here the opinion was divided. Some seemed to think that the deposit was finer, others that the throwing power of the solution was increased, and some that the cathode efficiency was decreased. The metal content was two ounces per gallon metallic copper, and this seemed to be the approximate amount used by most of the platers in the Philadelphia area.

BRASS PLATING

Brass Plating was the next subject discussed. Unfortunately, there is not much barrel plating of brass done in this section. However, one entire evening was devoted to this type of discussion, and one or two outstanding facts were brought to light.

First, and probably the most important, is the temperature control in barrel plating. The bath temperature is usually high, fairly warm by the end of the day, and while the first load will be a nice yellow the last load will be red, due to the copper depositing in a higher ratio in a warm solution.

Second, an iron pipe coil was placed on the side of the tank and connected to both the steam and cold water lines so that the solution could be warmed to about ninety degrees in the morning and kept there by the use of the cold water. This prevented much variation in the color of the deposit, and

eliminated the excessive use of ammonia. The effect of rochelle salts in a brass bath was also discussed, and everyone seemed to feel that it was decidedly beneficial, although the cathode efficiency was probably decreased to some extent.

Third, cyanide could be kept much lower without the formation of a film of zinc oxide, which is one of the most common troubles in brass plating. The metal ratio was discussed, and four parts copper to one part zinc seemed to be the most favored. Ammonia to the amount of one quart to 100 gallons, while making up a new bath, had a stabilizing effect on the bath. Cyanide should not exceed two ounces per gallon.

Carbonates also came in for discussion, although there has not been much said of the effect of excessive carbonate in a brass bath. Most platers seem to feel that they have no ill effects. Here, also, two to three ounces of sodium carbonate is added when the bath is made up, and then no further additions are made.

Arsenic dissolved in a sodium hydroxide is used as a brightener in a brass bath, and there are also patented brighteners to be had. The use of sodium hydroxide was discussed. A small amount up to one-quarter ounce per gallon increased the throwing power, but excess must be avoided, as too much will cause a gray deposit due to more zinc being deposited in the ratio to the copper, and further addition will cause a smudgy deposit.

The addition of too much arsenic will cause a gray deposit, and must be either worked out or taken out by immersing ordinary coke in the solution for ten or twelve hours. The formulae for brass plating are many and varied, but the one from Dr. Blum's book, page 385, No. 1, is generally accepted as the most popular. Zinc and cyanide and cadmium plating were discussed briefly, but no definite conclusions were reached on these baths. Also, various types of barrels were discussed, but everyone felt that the type we were using was the most efficient.

ARSENIC PLATING IN COMPARISON TO BLACK NICKEL PLATING

The last discussion taken up was arsenic plating in comparison to black nickel plating. The ease with which arsenic may be deposited, and the fact that colors from a deep black to a gray

may be obtained simply by varying the current density, and the fact that the deposit may be either burnished or color buffed and can be plated on any metal except aluminum or zinc, were pointed out.

Many antique finishes can be obtained by the use of this solution. Small brass parts with recessed parts can be plated black, and then tumbled with pumice or sand and water so that a good finish or an antique finish are the results. This solution is operated at room temperature and the current varied. A low current density will give a black deposit. A higher amperage will give a gray tone. The bath is made up in the original formula, which is as follows: White arsenic, ten ounces; caustic soda, ten ounces; copper cyanide, one ounce; sodium cyanide, one ounce; water, one gallon. Too much caustic will cause a gray tone, whereas too little will cause a smudgy deposit. Brass anodes are used, and a small amount of copper is added to intensify the bath. Enough copper and zinc is dissolved from the anode so that no further additions of copper are necessary. The above formula may also be used to a still tank with an excellent result, as the arsenic blends much better than the black nickel.

No attempt was made to give details of materials to be plated or to figure costs, as we believed this to be more of a problem for individual plants. When there is only one barrel the cost will be much higher than when there is a battery of ten or more that are operated automatically, since a single barrel must be loaded and unloaded manually.

The use of brighteners in barrel plating was discussed, but the bright plating as used for finishes varies from semi-luster to brilliant luster, and many felt, to get a deep luster, that buffing was necessary.

Control of the solution by analysis was also discussed, and it was found that all standard plating baths in the Philadelphia area are chemically controlled, mostly by the methods as outlined by Dr. Blum and Mr. Hogaboom in their book.

Most of the platers have learned elementary chemistry to aid them in their work.

CHAIRMAN BARROWS: We have had a very practical paper

by the active platers of the Philadelphia area. I hope that the paper will receive a very spirited discussion. We will now proceed with the discussion of this paper.

DELEGATE J. W. HANLON: In your statement, Mr. Underwood, did you mean that you used a cast anode in that brass solution, or a rolled anode?

DELEGATE UNDERWOOD: I don't know what type of anode was used in the brass solution. This paper was taken from discussions, and merely the highlights of the discussions were touched upon. Some of the members of the Philadelphia Branch wrote papers, but to incorporate in this brief paper all that was contained in those papers, would have taken too much time; so we just touched upon the highlights as we saw them.

CHAIRMAN BARROWS: Are there any other questions?

MR. C. J. WERNLUND (Niagara Falls, New York): I should like to ask for the formula of that black arsenic.

DELEGATE UNDERWOOD: Ten ounces of white arsenic, ten ounces of caustic soda, one ounce of copper cyanide, one ounce of sodium cyanide, and one gallon of water, using brass anodes.

PAPER AWARDS COMMITTEE

President Wilson announces the following members of the Papers Award Committee:

C. E. CLENDININ	Chicago Branch
PAUL OLDAM	Newark Branch
DR. MORTON BECKWITH	Anderson Branch
A. HERMANSEN	Milwaukee Branch
W. J. R. KENNEDY	Springfield Branch

PHILADELPHIA BRANCH HAS THE PRIOR CLAIM

In Mr. Sage's letter published in the December REVIEW, the claim is made that the Research meeting to he held in Boston, Jan. 25. of local manufacturers is the first of many such meetings being held in various sections of the country.

On November 9, Philadelphia Branch held such a meeting at Temple University with the same object in view, and with Dr. Blum as the speaker.

We are pleased to give Quaker City members honor where honor is due them.

SECOND ANNUAL SALES CONVENTION

Approximately forty Stevens salesmen from various sections gathered at the Hotel Statler in Detroit to attend the Second Annual Stevens Sales Convention.

Very interesting and educational business sessions kept the men busy every minute of the two day meeting.

A banquet attended by all representatives of the company and the complete office staff was presided over by Mr. W. Joseph Cluff, president, who introduced the speakers of the evening Mr. M. W. Bingay, managing editor of the Detroit Free Press and Mr. James M. Hughes, ex-Congressman from Wisconsin.

Here and There

New Haven's first meeting of the new year was held at Yale University on Tuesday Eve., Jan 4. There was an attendance of approximately 125.

Mr. Garner of the International Silver Co. gave a talk on Automatic Polishing Machines. A long and interesting discussion followed. Mr. Sullivan of the local branch spoke briefly on the B. E. K. Process of Gold Plating. He also showed samples. There was keen interest in this method also.

The Platers Class to be held at Sterling Laboratory has been started with an enrollment of 53 members. Tom Chamberlain had charge of the meeting.

Moving Picture, Chemistry and Science by Mr. Lee Sparks of the DuPont Co.

Boston Branch meeting was held on Thursday Eve., Jan. 6 at the Bradford Hotel. President Arthur Mintie was in the chair. Mr. Oliver Sizelove was the speaker, his topic — Questions and Answers. Oliver was kept busy answering questions all evening.

Mr. Bert Sage spoke of the coming meeting of the Research Committee on Jan. 25 at the Bradford Hotel. At this meeting it is hoped that a large number of manufacturers will be present to hear Messrs. Blum, Hogaboom and Phillips tell about the Value of Research to Industry.

At this meeting, it was voted to send a large delegation from Boston Branch to the Providence Branch meeting on January 21, at which time a strong effort will be made to stimulate the work of the A.E.S. in Providence and Attleboro.

Thanks to the combined efforts of the officers of Binghamton-Elmira Branch and Mr. Frank Mesle of the Oneida Community Co., we had a fine meeting at the Oneida plant on Monday, Jan. 10. This meeting was called to give the platers in the Syracuse-Utica area an opportunity to become interested in the A.E.S. Our 3rd Vice-Pres., Austin Fletcher who suggested the idea was amply repaid for trying the experiment by the splendid response given. At 2:00 P.M. we were welcomed by the officials at the plant and were then conducted through each department. It was amazing to see the volume of work being done and the up-to-the-minute methods of production. Going through such an immense plant is an education in itself. The courtesy and cooperation of the plant management on an occasion such as this is something that will linger in our memories for many a day.

At 5:00 P.M., the meeting was called to order by Mr. Mesle who introduced the Vice President of the Plant, Mr. Kellner who, in a few well chosen words, said many nice things regarding the A.E.S. Mr. Thurber of Oneida Ltd. spoke on silver anodes and used the lantern to illustrate his talk which was well received. Supper was then served to about 50, and after the meal, Mr. Oliver Sizelove gave a fine talk on "Bright Nickel". After many questions were asked, the meeting was adjourned with an invitation to all to avail themselves of the facilities of the recreation rooms.

It was a fine get-together, and we hope it will be duplicated. Much good always results from such meetings especially with the fine spirit shown by all those who attended the meeting.

After leaving the Oneida meeting our next stop was Racine, Wisconsin where our hard working 2nd Vice President and chariman of the Educational Committee lives, Mr. R. M. Goodsell. Visiting the Racine Plating Works, we were introduced to Mr. Goodsell's partner, Mr. Howe, and saw some fine hard chrome plating being done. This is a large shop, well equipped to do all kinds of plating.

Previous to the Milwaukee Branch meeting on Thursday night, we visited Cutler-Hammer Co., where we met Vincent Sheehan, Phil Ritzenthaler, and Henry Bornitzke, three of the boys of whom Milwaukee Branch is justly proud. Also called at the Acme Galvanizing Co., and met Mr. Herman, a new member who impressed us as being the type of man we should have in all our branches. Stopped at National Plating Co., where quantities of beautiful bright zinc was being done by the barrel plating method. Called on our old friend, Dan Wittig, and then went to S. K. Williams Co., and met the two Steurnagels, father and son. Bob is getting ready to install colored plating, a new departure in plating methods.

The Milwaukee Branch meeting was an inspiration; everything seemed to be in harmony; everyone was so friendly and enthusiastic that we were sorry to leave. The speaker of the evening, Mr. F. F. Oplinger was at his best and kept everyone interested in the seriousness of the problem to industry concerning the disposition of waste alkali and cyanide solutions. Mr. Oplinger informed us of the work of his company, the R. & H. Chemicals Div., of DuPont Co. is doing to help solve some of these problems.

Five candidates were elected and initiated. This was a novel procedure that could well be imitated by all our branches. The sargeant-at-arms, (Dan Wittig) escorted the candidates to the rostrum as their names were called by the secretary. The Sargeant-at-arms questioned the candidates. The president, Mr. Goodsell, read the obligation. (This will be printed in next month's REVIEW.) The newly elected members face the audience and are introduced as the audience rises and applauds. Sometimes the candidates are asked to make a few remarks.

Refreshments were served at which time everyone became acquainted. Mr. Goodsell is to be congratulated on the success with which Milwaukee Branch is carrying on.

On Friday night, the 18th, the Convention Committees met and read their reports. Everything is coming along in good shape. We should have a great meeting in Milwaukee in June. Thanks to every member of the branch for such a fine time in Milwaukee and Racine.

On Saturday the 15th, Chicago held its 26th Annual Banquet and Educational Session at the Palmer House. Over three hundred were in attendance at the afternoon session. Mr. Oscar Servis presided and kept things interesting from start to finish.

Our national President, A. B. Wilson, was the first speaker and gave all those present his impressions of the Society in general, asking for more activity in all our branches toward increase in membership and cooperation of our members as regards soliciting more advertising for the REVIEW.

Other speakers were as follows:

pH and Electrode Reactions—Ernest H. Lyon, Jr., Meaker Co.

Alkaline Cleaners and Wetting Agents—Frank K. Savage, C. G. Conn., Ltd.

A Review of Bright Nickel Processing in Commercial Use, Trouble Encountered and Proof Derived in Using Bright Nickel — Oliver Sizelove, F. Gumm Chemical Co.

The Purification of Plating Solutions by Electrolysis — V. Mattacotti, Hanson-Van Winkle-Munning Co.

Coloring of Cadmium — W. J. Erskine, National Lock Co.

The Banquet at 7 was a tremendous success, far beyond the expectations of the committee. There were over seven hundred tickets sold, of which 681 were served. The committee in charge deserves great commendation for the whole affair. Everything was done without confusion; the floor show was clean and amusing. Everyone had a good time between the courses and after as the orchestra played and the guests danced. We believe this is the most largely attended affair of its kind in A.E.S. history. Our hats are off to Chicago Branch for a swell affair.

The baby branch of our organization held its regular meeting on Monday Eve., Jan. 17 at the Stratford Arm Hotel, Buffalo. On the way back from Chicago we stopped to see how the infant was getting along and found her strong and healthy.

Dinner was served to twenty-four, after which routine business was transacted. Mr. Harvey Slatin, chief chemist of Trico Products Co., gave a very interesting address on "Bright Nickel Solutions". Buffalo Branch members are very enthusiastic about the future and are cooperating splendidly with Mr. Ruff, the President, and Mr. William Hart as Secretary.

MILWAUKEE BRANCH

The Milwaukee Branch had one of those meetings that the members will long remember last night, Jan. 9, 1938. Our guest of honor was the well known "Bill" Kennedy. He told us much of what was being done to enlarge the field and the activities of the A.E.S., and the formation of a new branch at Buffalo, the 29th in number. He spoke of an interesting trip through the Oneida Community firm at Utica, N. Y. Mr. Kennedy touched briefly on the proposed changes in our constitution. I believe, that the members of the Milwaukee Branch were "sold" on the idea of giving favorable thought to the much discussed Boston amendment. This will definitely be taken up at the Milwaukee National Convention.

There is a definite feeling among the local membership that we should be more liberal with our new members. That we should be more free with our information, it is well known that any information we may have is soon broadcast, therefore, why not be the one to cast this much needed information about so that we may get due credit for it, and this will strengthen our organization immeasureably.

Mr. Floyd Oplinger of R. & H. told us of the new research going on in the field of getting rid of, or destroying waste cyanide and alkali solutions. With large manufacturers this is a big problem, and many of the States are formulating laws to prohibit the use of sewers, rivers or lakes for emptying discarded solutions, It is not necessary to go into the details of the method now employed, as it is hoped that this information will soon be published in the "REVIEW". Sufficient to say that cyanides are not easily destroyed and are very deadly to plant and animal life. We wish to take this opportunity to thank Mr. Oplinger for his timely topic.

About sixty men attended this meeting and we also installed five new members.

John L. Northrup, associate; Waterloo, Ia.
Joe Boughner, active; Milwaukee, Wis.
Clayton L. Finch, associate; Sheboygen, Wis.
Walter F. Geil, associate; Milwaukee, Wis.
Emil Gralski, active; Milwaukee, Wis.

Many of the Chairmen of the Convention for 1938 have their work well in hand, and everything is progressing with smoothness.

A. J. HERMANSEN, *Sec.-Treas.*

S. C. Taormina has been appointed Technical Director of the Platers Research Co., 72 Grand Avenue, Brooklyn, N. Y. Mr. Taormina graduated from the Industrial Chemical Engineering course at Pratt Institute of Technology in June 1923. Since then he has been chemist and engineer for a number of firms in related industries. In 1932 he joined the U. S. Research Corp., under Dr. L. C. Pan, as service engineer, and later succeeded Dr. C.B.F. Young as Technical Director. In July 1937 Mr. Taormina opened his own laboratories as consultant in the electroplating field.

Dr. C.B.F. Young, well-known electrochemist, has been appointed Technical Adviser to the Platers Research Co., Brooklyn, N. Y. This company specializes in the manufacture of control units for the analysis of electroplating baths.

BALTIMORE-WASHINGTON BRANCH

Annual Educational Session and Dinner-Dance

SATURDAY, JANUARY 29, 1938

LAFAYETTE HOTEL — 16th and Eye Streets, N. W.
WASHINGTON, D. C.

EDUCATIONAL SESSION — 1 P. M.

Walter Meyer, General Electric Co., Bridgeport, Conn.
Subject: "Zinc Coatings"

James Higgins, Packard Motor Car Co., Detroit, Mich.
Subject: "Plating in the Automotive Industry"

Dr. R. W. Mitchell, Magnus Chemical Co., Garwood, N. J.
Subject: "Emulsion Degreasing"

Abner Brenner: National Bureau of Standards
Subject: "The Magnetic Method for Measuring the Thickness of Non-Magnetic Coatings on Steel"

Dinner, Entertainment and Dance 7 P. M. *$2.50 Per Person*

A SONNET
to the
1938 CONVENTION

Listen you platers and you shall hear,
Of a big convention that is drawing near.
A trip you should all plan to take,
To a beautiful city on the banks of a lake.
This city is planning to turn over the key,
In this great city of Milwaukee.
At the headquarters you will be treated swell,
Centrally located at the Schroeder Hotel.
The Committee, it is their very best intentions,
To make this one of the biggest conventions.
For beer that has made this a famous city,
If you don't get there 'twill be a pity.
Make your reservations early and don't be late,
For June 14th to 17th are the dates.

ROBERT B. GOODSELL
Publicity Chairman

Business and Social News

BRANCH NEWS

Educational Activities

AMERICAN ELECTRO-PLATERS' SOCIETY

BRIDGEPORT BRANCH

The regular monthly meeting of the Bridgeport Branch was held in the Chamber of Commerce Rooms at the Stratfield Hotel on Friday evening, December 3. There were forty members present. Joe Sterling called the meeting to order.

The roll call of officers was read. The minutes of the last meeting were read and accepted.

The Sick Committee reported Walter Meyer was ill.

The membership Committee has added Ray O'Connor as a committeeman.

Ray O'Connor was also chosen to be Chairman of the Committee on Exhibits at the Milwaukee Convention, to be assisted by Eugene Phillips Joe Sterling, Ed. Charleson, and George Wagstaff.

After a talk by Mr. Charleson concerning exhibitions at Conventions, the Bridgeport Branch voted its support to the Milwaukee Branch in regard to exhibits at their convention.

Bills against the Branch were ordered paid. The treasurer's report was read and accepted.

Ray O'Connor introduced the two speakers of the evening, Mr. Munning of New Jersey who spoke on "Cleaning and Pickling", giving answers to questions asked afterwards, and Mr. T. H. Wilbur of the Bullard Co., Bridgeport, who spoke on "The Bullard-Dunn Process".

WM. H. FLAHERTY, *Sec.*

TOLEDO BRANCH

A meeting of the Toledo Branch A.E.S. was held Thursday, December 2, in the offices of the Spanolis Plating Co., with 22 members and one visitor present. Our visitor happened to be Mr. W. J. R. Kennedy, Editor of the REVIEW and National Secretary of the A.E.S. We felt highly honored to have such a distinguished visitor in our midst.

The meeting was called to order by President Moore.

The minutes of the previous meeting were read and adopted. All bills were ordered paid.

Two members were selected to represent our Branch at the Detroit Educational Session and Dinner Dance to be held December 4 at the Statler Hotel. Quite a number of members and their wives plan to be present at this auspicious occasion. We wish the Detroit Branch every success in this new venture.

Mr. Kennedy was then called upon to say a few words, and responded by giving us a very fine talk on the problems and aims of his office and that of the Bureau of Standards, after which he answered a host of questions put to him by our members. We hope we may have the pleasure of having him visit us again in the near future.

The question box brought forth a number of questions which produced an hour of lively discussion among the members. All in all it was one of the best meetings we have had this season.

The meeting was then adjourned, and the usual Dutch Lunch served.

W. WEIKER, *Sec.*

MILWAUKEE BRANCH

Milwaukee Branch held its regular monthly meeting December 9, 1937. It was a rather cold night but a good crowd was on hand to hear Mr. F. Hurst of Roxalin Flexible Lacquer Co., give an interesting talk on Ba-Flex baking enamels and he showed us some beautiful finishes and was kind enough to answer a multitude of questions. We wish to thank Mr. Hurst's employer and Mr. Hurst for his worthwhile talk.

Mr. Robert Steuernagel, Jr., son of our well known Milwaukee Bob, made application for admission into this Branch.

Milwaukee Branch is making tentative plans for a purely local dinner dance February 12, 1938, at the Schroeder Hotel, in preparation for the Convention.

In the question box we found the following:

1. *What is a good Rochelle Salt copper plating bath?*

Ans. 8 oz. Rochelle Salt per gal., 2.5 to 3.5 of copper per gallon, .5 to .8 oz. free CN per gallon.

2. *In using a Rochelle Salt bath in a steel tank how can you prevent the tank from corroding?*

Ans. Keep pH of solution at 12.3 or slightly above.

3. *How is whale oil soap used on an anti-rust medium?*

Ans. Use 8 oz. whale oil at a boiling temperature.

4. *What is now the best bright dip for zinc plated parts?*

Ans. Nitric acid dip is still considered best.

A. J. HERMANSEN, *Sec.-Treas.*

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... because their unexcelled purity assures uniform corrosion, the highest quality deposit in the shortest possible time and low scrap losses. Furnished with suspension holes drilled as desired, or tapped for end hooks.

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THE AMERICAN BRASS CO.

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Offices and Agencies in Principal Cities

WATERBURY BRANCH

The December meeting of Waterbury Branch was held at the Waterbury Club on Central Avenue and we had an unusually large attendance including many non-members from Waterbury and surrounding towns.

Dr. Wm. Blum of the Bureau of Standards spoke on the "Value of Research to the Business Executive."

Dr. Blum gave a very interesting talk on the work that has been done at the Bureau of Standards by the research associates stationed there by the American Electro-Platers' Society and demonstrated how the money spent for these researches could easily be justified. At the end of his talk several questions concerning specific points were asked.

The meeting adjourned at 10:30.

Mr. William Moriarty and Mr.

Joseph Petrocelli were elected members.

The program for the rest of the year was announced, and the subject of the talk for the January meeting will be "Bright Nickel" by Dr. Louis Weisberg of Louis Weisberg, Inc. This meeting will be held at the Hotel Elton.

E. T. CANDEE, *Sec.-Treas.*

CHICAGO BRANCH

The regular monthly meeting of Chicago Branch was held December 11 at the Atlantic Hotel; President E. Stepka presiding and all other officers present. The applications of Mr. E.I. Hansen and Mr. F. Bervey were read and committees appointed on same.

Mr. Gilbertson reported all plans complete for our annual banquet and educational session, and after hearing Mr. Servis read the titles of the papers for our educational session this should prove to be one of the most interesting meetings ever held in Chicago.

Mr. C. S. Tompkins was appointed by Mr. E. Stepka as chairman of the membership committee for Chicago Branch. Mr. Gilbertson reported that Mr.Tom Kennedy was very ill. Chicago Branch officers and members express their best wishes to Mr. Kennedy and wish him a speedy recovery.

The librarian found the following questions in the question box:

No. 1. *What advantage is there in nickel plating cast iron lamp bases before brass plating?*

Answer. This question brought out a lot of discussion for and against this method, but it was thought that the nickel plating before brass plating helped to get a more even color, and you do not have to run the bases so long in the brass solution to obtain a satisfactory deposit.

No. 2. *How long will a lacquer coat protect work from outdoor exposure?*

Answer. It somewhat depends on what type of metal it is used on, also using the right type lacquer, one member stated that on polished steel a test was made and the lacquer failed after three months, allowing rust spots to show, while another member stated that a bronze article that had a heavy coat of lacquer had stood up for several years.

No. 3. *What causes lacquer to turn yellow?*

Answer. There are many reasons, but mostly sun light, however the cotton used in making lacquers must be carefully selected and treated and washed otherwise it will cause lacquer to turn yellow in a short time.

No. 4. *What is the best way to control and hold constant the pH. of a nickel solution?*

Answer. Have enough boric acid present and the proper relation between cathodes and anodes.

No. 5. *Can No.* 12 *aluminum castings be nickel and chrome plated with a* $\frac{1}{2}$ *inch back ground so that same will have a deposit of plate to stand at least a* 6 *hour salt spray test?*

Answer. Yes.

No. 6. *What effect will Rochelle salts have on the iron containers for copper ball anodes, used in a copper solution?*

Answer. This brought a lot of discussion but it was thought that there would not be enough iron getting into the solution to cause any harm.

No. 7. *What method is used to oxidize brass plated articles for statuary bronze?*

Answer. There are several ways, such as after brass plating, dip in a 2 or 3 oz. per gal. of copper sulphate, then oxidize in either barium carbonate, liver of sulphur, or antimony sulphite and caustic soda.

J. W. HANLON, *Sec.*

BOSTON BRANCH

Boston Branch met Thursday the 16th at the Bradford Hotel with Pres. Mintie in the chair. Minutes of the previous meeting were read and approved. Communications read and placed on file. Bills read and moved they be paid. Report of the membership committee was made and they are working hard to bring in more members.

Joe Barron made a report on the banquet and says that the ads are coming in every day and that it will be a bigger and better program than last year.

Three applications were read for the first time and turned over to the board of managers to be acted upon at the next meeting as follows: J. Edward Upham, 444 Woodward St., Waban, Mass., Associate; Edward F. McNevin, 46 New Cross St., Somerville, Mass., Active and Frank L. Sample, Jr., Yankee Electro-Plating Co., Rochester, N. H. Associate.

The librarian found a few questions in the question box and he answered them for the members, finishing up with a discussion for half an hour.

There being no further business the meeting adjourned and the chair turned over to Joe Barron for the stag party. He arranged an entertainment and refreshments for the members and they all had a good time, thanks to our out-of-town friends. The fun ended at midnight.

A. W. GARRETT, *Sec.*

CLEVELAND BRANCH

The regular monthly meeting of Cleveland Branch of the American Electro-Platers' Society was held at Hotel Cleveland, Saturday, December 4, 1937. Meeting called to order by our President, Mr. Wm. Scott at 8:30 P.M. The minutes were approved as read. There were no applications or elections.

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64-68—1⅛" arbor—20 ply

Full Disc - Loose - or Sewed

Thousands of every size

8"—8¢ each 9"—9¢ each

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The entertainment committee reported that we will have an informal Dinner Dance some time in February.

Mr. B. Case, of the Eaton Detroit Metal Co., gave a very interesting talk on "The Modern Trends in the Plating Room." In his talk he hit on the subject of straight nickel on steel with alloy nickel and the use of wetting agents in nickel solution.

After Mr. Cases' talk, refreshments were served.

The next meeting of the Cleveland Branch will be held Saturday, January 8, 1938.

Meeting adjourned at 10:45.

CHARLES F. OTT, *Sec.*

LOS ANGELES BRANCH

The regular monthly meeting of the Los Angeles Branch of the A.E.S. was held, December 8, 1937, at the Rosslyn Hotel. President John L. Merigold presided. Twenty-four members and four visitors were present.

On the educational hour Mr. Maurer, Chief Chemist of General Electric Corp., Ontario, California, presented the second of a series of instructions on modern methods of electro-plating. Keen interest was shown in a miniature plating device which registered

the anode and cathode efficiencies as various constituents of the plating bath were added.

Mr. Maurer was given a vote of applause by all present.

Meeting adjourned at 11 P. M.

RAYMOND SOLIVAN, *Sec.-Treas.*

NEW HAVEN BRANCH

On December 7, 1937 the New Haven Branch held a dinner at the Hotel Garde for members and guests. About seventy attended and enjoyed a fine dinner. Mr. Wm. Rush of the Chase Brass Co. in Waterbury was introduced by Joe Downes the toastmaster. Mr. Rush gave a very amusing after dinner speech.

After dinner the party adjourned to the Sterling Chemistry Laboratory where Mr. Edmund Bucy of the Zapon Lacquer Co. was the guest speaker of the evening. Mr. Bucy gave a most interesting and instructive talk on the manufacture of lacquers and enamels. He came equipped with slides and samples of the various ingredients of the lacquers. There were about one hundred and forty people at the open meeting and all gave evidence of enjoying Mr. Bucy's talk. Many questions were asked and the discussion after the paper had been read lasted over an hour.

The next open meeting of the New Haven Branch will be held on January 4 at that time we will have a talking picture called "Chemistry in Industry." The picture will last about forty minutes. After the picture there will be an open question-box discussion. Members and guests are invited to come prepared to ask questions and discuss problems they have met and overcome.

On January 6 the first regular meeting of the class in analysis of plating solutions will be held. The class will meet every succeeding Thursday night for sixteen weeks. The class is limited to fifty members and about forty places have already been filled. If anyone is interested in joining the class, please communicate at once with the New Haven Branch. Dr. John Vance of the Chemistry Department of Yale University will act as instructor.

CHAS. H. COSTELLO, *Sec-Treas.*

ROCHESTER BRANCH

The Rochester Branch held its regular monthly meeting on Friday night, December 17, at the Rochester Liederkranz. Meeting was called to order by President Kohlmeier. Regular business was transacted during which the following were elected as members: Mr. Christian C. Boehm, associate; Mr. Harry F. Speary, active; Mr. Wm. M. Tucker, associate; and Mr. Paul H. Tufts, associate. The committee for the Annual Meeting to be held on Saturday, April 23, was named. Mr. Raymond Del Rosso was made chairman. There will be more about this meeting in later issues. It was agreed to hold the January meeting as a dinner meeting the speaker to be announced later. After a short discussion on Wetting Agents the meeting was adjourned.

JUDSON R. ELSTER, *Sec.*

MILWAUKEE BRANCH

Mr. Claude A. Terrill, one of our members, passed away December 15. He was the local representative of the J. B. Ford Co., Wyandotte Line of Detergents. He was also on the Convention Committee for 1938.

Our local President, Mr. R. M. Goodsell, has appointed Mr. Irving M. Herrmann, 906 E. Bay St., Milwaukee,

Wis., as Chairman of Hotels and Reservations Committee for the 1938 Convention.

A. J. HERMANSEN, *Sec.*

SPRINGFIELD BRANCH

The regular meeting of the Springfield Branch A.E.S., was held Monday evening, December 27, at the usual place. There was a fairly good attendance, considering our holding the meeting so soon after the holiday. Mr. Kennedy acted as chairman. The minutes of the previous meeting were read and approved.

A letter from the Milwaukee Branch, in reference to presenting a paper at the convention, was read. Mr. P. W. Prouty made a motion that was carried, which was, that we should present a paper. The title is to be, "Answers to 101 Questions on Copper Plating," presented by Mr. Kohlmeir of the Rochester Branch, at the New York Convention. A committee was appointed to work up this paper, Mr. Prouty being made chairman.

A letter, referring to an exhibit for the Milwaukee Convention, was read and discussed.

The financial report of the educational session and banquet was accepted, and the committee discharged with thanks.

All bills were voted paid.

Mr. Colin Hasite, of the Westinghouse Electric & Manufacturing Co., explained the new plating department built at the Westinghouse plant, and also invited the members to visit it at any time. He was given a vote of thanks after which the meeting adjourned.

HENRY R. DELARM, *Sec.*

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PROVIDENCE-ATTLEBORO BRANCH

The Providence-Attleboro Branch held its regular meeting at Narragansett Hotel, Friday, December 17, 1937. The Executive Secretary was present and, as Mr. Chace was unable to attend, Mr. Kennedy was asked to act as Chairman. He introduced Mr. G. Klinkenstein as the speaker of the evening. Mr. Klinkenstein gave a very interesting talk on Lacquers, following which, he described the method of producing a number of samples as they were passed around by Mr. Treadwell; then there was a question period, after which, Mr. Klinkenstein was given a rising vote of thanks.

Mr. Kennedy then took up the welfare of the Branch; stating that he was not satisfied with the present condition and citing the recent growth of Boston Branch. He thought Providence Branch could be built up to a much larger number than it now has.

There was considerable discussion and suggestions principally by Messrs. Weisberg, Chace of Baltimore Branch, Rinker, Treadwell of Boston, and Mr. Kennedy.

It was decided: To devote the next meeting to boosting the Branch.

Boston is to send a crowd; Mr. Kennedy promised to send a letter to a list of manufacturers; and a committee was suggested to provide refreshments at the meeting.

There were 30 present.

The next meeting will be Friday, January 21, 1938.

J. ANDREWS, *Sec.*

BINGHAMTON-ELMIRA BRANCH

The regular meeting of the Binghamton-Elmira Branch was held Dec. 13, at the Y. M. C. A. Dinner was served at 6:30.

The speaker for the evening was Mr. D. X. Clarin of The Oakite Chemical Co., who presented a paper on Hydrophylic Films, which proved to be very interesting and instructive. The samples of nickel on brass demonstrated the effects of chromic acid in a cleaning solution. One sample which was cleaned in a cleaner containing 1 oz. of chromic acid to 15,000 gallons was the best sample of crackle nickel the writer has ever seen. Another sample which was perfect was cleaned in a solution containing 20 oz. of chromic acid to 15,000 gal. solution. The solution being used was a high tolerance chromic acid cleaning solution which permits these Hydrophylic Films.

The meeting adjourned with thanks to Mr. Clarin and Mr. Haines of the Oakite Chemical Co.

A. FLETCHER, *Sec.*

DAYTON BRANCH

The December meeting of the Dayton Branch was held at the Engineers Club on Tuesday, December 7th.

After hearing a letter from Mr. Geissman concerning the proposed paper for the 1938 convention, the committee announced that their plans were not complete.

There being no further business, Mr. Conley introduced our speaker, Dr. Blum of the U. S. Bureau of Standards, who talked on "The Specification and Testing of Electro-plated Coatings".

Dr. Blum gave his definition of plating as "Electro-deposition either to change the properties or to increase the dimensions of the base metal".

Protection is by far the most important property of plating and to have this protection at its maximum is the reason for specifications.

Many ways have been devised by which the properties of a plated coating can be tested to see that these specifications are met with.

Exposure tests are useful in research, but the time involved makes them of no practical value in acceptance testing.

The salt spray test is very often misleading, as in the case of zinc and cadmium. Cadmium stands up much better than zinc in the salt spray, yet exposure tests have proven zinc the best for industrial locations.

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Analyzes and corrects copper, free cyanide and carbonate contents.

With purchase of 7 bottles of Reagents @ 2.50	17.50
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Analyzes and corrects copper, zinc, free cyanide and carbonate contents.

With purchase of 10 bottles of Reagents @ 2.50	25.00
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methods, rate of attack, and magnetic methods.

Of these, the microscopic is no doubt the most accurate, providing the operation is done with the proper care and by someone with experience.

Thickness tests also indicate, to a certain degree, the porosity on noble metals. Most porosity tests are not very quantitative.

Specifications usually call for a minimum thickness, for which tests should be made accordingly.

Two ways have been devised for testing the adhesion quality of a plated coating, the cylinder and ring method and the strip method. In both of these the plate is separated from the base metal mechanically and the force necessary is measured.

One fault of methods for measuring adhesion is that, if the adhesion is good enough, the top layer of base metal pulls loose with the plate.

There is a method for measuring the brightness of a plated coating by measuring its reflectivity, but this is not very practical. The eye alone is much more sensitive to light changes than the mechanism used.

Dr. Blum stressed the fact that there was room for improvement in all these methods and many new tests yet to be learned.

Much interest was shown in the Brenner Thickness Tester used for measuring thickness by the magnetic attraction of the base metal or the plated coatings. In this machine a small magnet is lowered until it just touches the piece to be measured, and the force necessary to pull this away is shown by a dial reading.

At the close of the discussion following his talk, Dr. Blum was given a rising vote of thanks and our meeting was adjourned until the first Friday in January.

On Wednesday, December 8th, the members of the Dayton Branch heard Dr. Edwards of the Aluminum Company of America talk on "Anodic Films on Aluminum" as guests of the American Society for Metals.

Dr. Edwards explained the natural oxide films on aluminum and that they only form a very thin film and then stop. These thin films are easily penetrated.

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etching the aluminum foil before treatment, thus increasing the oxidized surface on the finished part.

When run as an anode in sulphuric acid the film can be made as much as one-thousandth in thickness and is very porous and absorbent, making them very easy to dye in any color. However these dyes are not permanent, especially for any outdoor use.

The largest use of these films is in the plain condition. They are very hard and resistant to corrosion, especially after the pores have been sealed by immersing for a certain length of time in boiling water.

One peculiarity of aluminum so treated is that the film shows no X-Ray pattern.

Chromic acid used as an electrolyte gives a very good film, except that it is colored and could not be used where appearance is important.

When treated electrolytically in a solution of fluoboric acid the surface of aluminum tends to become hard, smooth and bright, making a highly efficient reflector.

Dr. Edwards' talk and demonstrations on this comparatively new phase of the plating industry were much appreciated by the members of the Dayton Branch.

CORLISS W. POWELL, *Sec.*

NEW YORK BRANCH

The New York Branch held but one meeting during December, Friday, December 10th, the second meeting being cancelled because of the Holiday Season. It was a general business meeting, several matters of Branch importance being up for discussion and action. It was followed by an educational session of much interest, there being an animated discussion of several formulas for the making and maintenance of brass plating solutions and the results that were obtained from same. A number of samples of brass plated steel articles from both still and barrel plating process and antimonial lead castings finished in antique brass colors were displayed. It was a large meeting, fifty-two members being in attendance. The discussion and explanation of the various formulas and processes lasted for two hours. A very great interest was displayed by the members in this connection.

During the month of January the Branch will present for the interest of its members, Mr. Albert Hirsch, past president of the Philadelphia Branch, and electroplating instructor at the Jules Mastbaum Vocational School, who will lecture on the subject of "The Effect of Sodium Cyanide, Sodium Carbonate and Rochelle Salt on the Cathode Efficiency of a Copper Electroplating Solution."

At the second meeting, Wednesday, January 26th, Dr. William Blum of the U. S. Bureau of Standards, Washington, D. C., will give a talk on the work of the Research Committee, its problems and plans for the immediate future.

At the first meeting in February, Friday, February 11th, the Branch will be favored with a double feature presentation on the subjects of the pH of Electroplating Solutions by G. Byron Hogaboom, Jr., consulting engineer, Newark, N. J., and the pH of Alkaline Plating Solutions, illustrated, by George B. Hogaboom of Hanson-Van Winkle-Munning Company.

The Branch elected two new applicants to membership and re-instated one old member and received one application for membership during December.

F. J. MACSTOKER, *Sec.*

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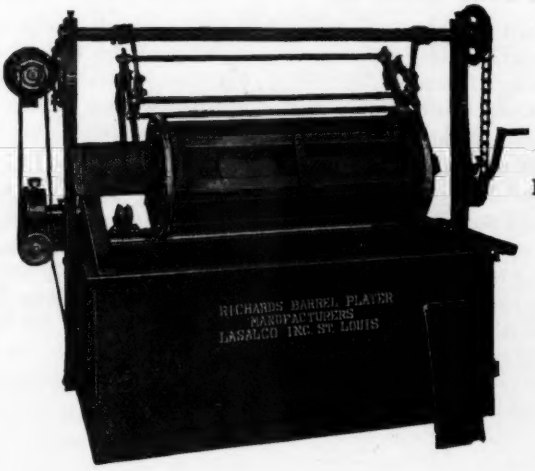

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HARTFORD BRANCH

The Hartford Branch of the A.E.S. held its regular monthly meeting on Monday evening, December 20, 1937, at the Elk's Club, Bristol, Conn.

The meeting was called to order at 8:30 p.m. with President Pietro in the chair. Minutes of the previous meeting were read and accepted. All communications were read and placed on file. No bills were presented.

Under new business, it was decided to have a branch paper as well as a branch exhibit at the 1938 National Convention in Milwaukee. The exhibit committee consists of Mr. Clarence Tucker, Mr. Alex Christie, and Mr. Oscar Crochetiere. The branch paper committee consists of Mr. Jas. Beloin, Mr. Jos. St. Pierre, and Mr. A. N. Austin.

The secretary was instructed to notify each member relative to the branch's plans, and to acquaint them with the method to be used in securing data for the paper.

After a very pleasant evening, the meeting adjourned at 11:00 p.m.

V. E. GRANT, *Sec.*

BUFFALO BRANCH

We were all ready to have our meeting on the 11th of December to elect our officers when along came the worst snowstorm Buffalo ever had and it was impossible to get the boys out for that night and for several days later.

The following officers were elected: Mr. Joseph Ruff, President; Mr. Alfred Boy, Vice-president; Mr. Wm. Hart, Secretary and Treasurer; Mr. Roderick McGee, Librarian; Mr. Warren Guy, Mr. J. T. Rooney, and Mr. Geo. Ambellan, Board of Managers.

We have decided to hold our meetings the third Monday of each month at the Stratford Arms Hotel.

I have notified all members in regard to their dues and will collect them at our next meeting.

I believe at that time I will need some membership cards and By-Law books and if there is anything else you may notify me at your convenience.

I am sending on some more applications and it looks to me that we will be able to move right along now seeing

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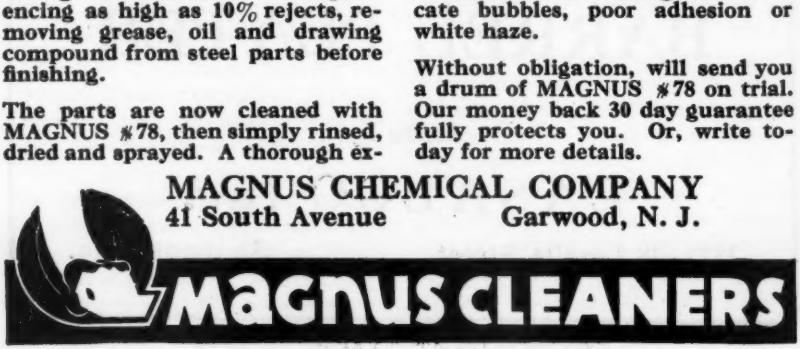

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that we have elected our officers and the Holiday Season is over.

WM. D. HART, *Sec.-Treas.*

BOSTON BRANCH

Boston Branch met thursday the 6th at the Bradford hotel, Boston, with President Mintie in the chair. Minutes of the previous meeting read and approved, communications read and placed on file. Bills read and paid.

Three applications were read for the second time, approved by the board of managers and elected to membership as follows: J. Edward Upham, 444 Woodward Street, Waban, Mass., Associate; Edward F. McNevin, 46 New Cross St., Somerville, Mass., Active and Frank L. Sample, Jr., Yankee Electro-Plating Co., Inc., Rochester, N. H., Associate.

Bert W. Sage made a report on the coming Research Committee dinner to be held January 25 at the Bradford Hotel, Boston, at 6.30 P. M. Tickets will be $2.75. Now don't be alarmed at the price because the valuable information received is worth a hundred dollars of any man's money. Come and see and hear some of the best speakers in the country on the Plating of Metals — such as Dr. Blum of the Bureau of Standards, Washington, D. C.; George Hogaboom, Hanson-Van Winkle-Munning Co. and Walter Meyer, General Electric Co., Bridgeport, Conn. These are a few of the speakers. Don't miss it.

Bert Sage also spoke of the work being done at the Bureau of Standards on the bright nickel solutions and that they are working out a report that may be heard at the Research Committee Dinner.

We had with us our worthy Executive-Secretary, Mr. William Kennedy, and our old pal, Frank Clark of Springfield Branch and they both spoke of the work that has to be done in the society. Mr. Kennedy spoke about the members trying to interest the supply houses to advertise in our MONTHLY REVIEW and after our banquet Boston Branch will try to do all they can to help this cause along. He also asked that all the members that can try and attend the next meeting of Providence Branch, January 21, at the Narragansett Hotel, Providence, R. I. A motion was made that the Secretary be instructed to hire a bus to take those members that wished to go to Providence, the price of the bus to be paid for by the members going. I don't think it will be more than $1.00 each. A report will be made at the next meeting on this.

Frank Clark spoke on the question of cleaners stating that we should have more talks on cleaners than we have had in the past as he says that if our work is thoroughly clean, there would be less peeling today, so he says let's have a few more talks on the cleaning of metal than we have had in the past so that the plater can't blame it on to the solutions when his work goes bad.

A report was made on the banquet and everything is coming along fine. The tickets will be in the mail before the next meeting of the branch and we hope that every member will give the committee all the support he can in making this banquet the best ever held.

The chair was then turned over to the

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librarian and he had one of the best friends the branch has — Mr. Oliver J. Sizelove of the Fredrick Gumm Co. His subject was "The Question Box" and my guess is that he had plenty of questions and a lot of the members also helped him out. He answered all questions from cleaners to bright nickels. He was given a rising vote of thanks for his very fine talk and Boston Branch is always glad to see him when he comes to Boston.

Meeting adjourned at 10.30 P.M.

A. W. GARRETT, *Secy.*

DETROIT BRANCH

The regular meeting of the Detroit Branch of the American Electro-Platers' Society was held at Hotel Statler, Friday evening, January 7th, 1938 and there were approximately 100 present.

Mr. A. B. Wilson, our president, was in the chair. The minutes of the previous meeting were read and approved.

There were several letters read and placed on file. A letter from the Milwaukee Branch regarding papers was read and referred to the Committee on Paper for Detroit Branch, Mr. Hoeffer. A letter from St. Louis and Chicago regarding their coming annual session, dinner and dance. A letter from Mr. W. J. R. Kennedy regarding the referendum asked for by Newark Branch regarding the Convention for 1939. Bills were allowed paid.

There was a report by Mr. George L. Nankervis, chairman of the annual educational session, dinner and dance and also one from Mr. Charles H. Eldridge, chairman of the program committee for same. Both reported a successful educational session, dinner and dance from every angle. Mr. Wilson thanked the committee for its services and having had a successful event. The committee as a whole were: George L. Nankervis, chairman, George H. Eldridge, chairman of program committee, W. W. McCord, who took care of the printing and the getting out of the program, Carl Heussner as our star advertising chairman, Mose Cherry who assisted Mr. Heussner very well, Charles Beaubien who assisted the secretary-treasurer in handling the tickets and the finances, and Mr. A. B. Wilson, ex officio.

We then had the speaker of the evening, Mr. William M. Phillips of the General Motors Corporation, who gave actual colored pictures on the screen on "Reactions in Depositions of Metal". It was very interesting and it is something entirely new and in another issue of the REVIEW there will be more about it and it will be thoroughly explained.

We then had the Question Box. There were quite a number of questions. The Question Box created quite a lot of interest and discussion.

There being no further business, the meeting adjourned at 10:30 p.m.

T. C. EICHSTAEDT, *Sec.-Treas.*

PHILADELPHIA BRANCH

Philadelphia Branch held its regular meeting with President J. E. Underwood presiding. A roll call of officers showed one absent. Minutes of previous meeting were read and approved.

A communication from Milwaukee Branch regarding papers for the convention was read. It was moved and seconded the Branch prepare a paper and invite individual papers from members, which motion was carried.

Under good and welfare Vice-president Fred Fulforth presented a very unique paper regarding the proper steel to use in the manufacture of articles to be Electro-plated. This paper is published in this issue of THE REVIEW so that the membership may

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avail themselves of this valuable information. After this splendid talk Mr. Fulforth was given a rising vote of thanks.

A motion was passed that the Branch hold a meeting at Temple College in conjunction with the research committee instead of our regular meeting December 17, 1937.

Past President A. Hirsch presided at the Temple University meeting and introduced Dr. Blum who gave a very concrete lecture on the value of research to the manufacturing plants. Also we were honored by the presence of our beloved friend Mr. W. J. R. Kennedy who gave a very interesting talk on why all the foreman platers in and around Philadelphia should be members of our society.

The following applicants, Clarence W. Smith, Thomas Wallace, William Bantle, Robert C. Ledig, Ernest Ohl, as active members, and Arthur C. Pearson, Frank Lawrence Oldroyd, Alfred Thomas Harris, George F. Bieber, as associate members, were referred to the Board of Managers for investigation.

ATTENTION — President Joe. E. Underwood is very desirous that every member attend the January 21, 1938 meeting as there are very important communications to be discussed and voted upon. Also we will be honored by one of the most interesting lecturers of the times, Dr. C. L. Mantell, Consulting Chemist Engineer from Brooklyn, N.Y. whose subject will be "Competition for the Electro-Plating Industries."

ROBERT E. JACKSON, JR., *Sec.-Treas.*

CHICAGO BRANCH

The regular monthly meeting of Chicago Branch was held Jan. 8, 1938 at the Atlantic Hotel.

President E. Stepka presiding and all other officers present.

A communication was read regarding the electroplating course offered at Lewis institute, starting Jan. 31, to May 19, 15 weeks, Mondays and Wednesdays from 8 to 9:40 P. M. Tuition fee $25 plus a fee of $5 for those registering at the Lewis Institute for the first time.

An application of Mr. H. DeGrenier was read and a committee appointed on same.

Mr. H. I. Hansen was elected an associate member. Mr. F. Bervey was elected to active membership.

The librarian found the following questions in the question box.

Q. Is there a quick method for determining the Hydrofluosilic acid in a chrome bath?

A. There is not a real quick method known by the members present, but there is a method for determining the hydrofluosilic in a chrome solution.

Q. What is a good bright dip for aluminum die castings, after they have been in the caustic soda bath?

A. Either a nitric acid dip or a Hydrofloric acid dip.

Q. Will ferric cyanide be formed in a Rochelle salt copper solution when using a plain steel tank? Will this cause any harm?

A. One member stated that he would recommend a rubber lined tank on large production. Other members stated no harm would result from using a plain steel tank providing the pH was controlled.

Q. What is a good cleaner to remove drawing compound containing castor oil?

A. A high caustic cleaner with plenty of soap in same.

J. W. HANLON, *Sec.*

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Membership Report

To January 1, 1938

ELECTIONS

Joseph V. Petrocelli, 41 Brown St., Waterbury, Conn. Asso. Waterbury Branch
Wm. T. Moriarty, 51 Ludlow St., Waterbury, Conn. Asso. Waterbury Branch
Paul H. Tufts, 11 Wayne St., Williamson, N. Y. Associate, Rochester Branch
Christian C. Boehm, Boehm Surgical Instrument Corp., 205 St. Paul St., Rochester, N. Y. Associate, Rochester Branch
Harry F. Speary, 622 Bennington Dr., Rochester, N.Y. Active, Rochester Branch
William M. Tucker, Roll Ctg. Dept., Kodak Park, Eastman Kodak Co., Rochester, N. Y. Associate, Rochester Branch
Norman F. Prince, 31 Lux St., Rochester, N. Y. Associate, Binghamton-Elmira Branch
William P. Albohn, 2308 Wheeler St., Cincinnati, O. Active, Cincinnati Branch
Fred Kelm, 25 Concord St., Jersey City, N. J. Active, New York Branch
Murray Isaacson, 110 St. Marks Place, N. Y. C. Active, New York Branch
J. Edward Upham, 444 Woodward St., Waban, Mass. Associate, Boston Branch
Edward F. McNiven, 46 New Cross St., Somerville, Mass. Active, Boston Branch
Frank L. Sample, Jr., Yankee Electro-Plating Co., Inc., Rochester, N. H. Associate, Boston Branch
H. I. Hansen, 230 E. Ohio St., c/o E. I. Dupont Co., Chicago, Ill. Associate, Chicago Branch
F. Bervey, 4643 N. Campbell Ave., Chicago, Ill. Active, Chicago Branch

APPLICATIONS

LaMoine Rutherford, 148 Chandler St., Adrian, Mich. Active, Detroit Branch
Ben Louis Bailes, 3836 Richton, Detroit, Mich. Associate, Detroit Branch
William S. Loose, Dow Chemical Co., Midland, Mich. Associate, Detroit Branch
Walter E. Charlton, 144 S. Navahoe, Detroit, Mich. Associate, Detroit Branch
Max Weinberg, Parker Wolverine Co., 2177 E. Milwaukee, Detroit, Mich. Active, Detroit Branch
Herman A. Doward, 1708 Mackin Rd., Flint Mich. Active, Detroit Branch
Clarence W. Smith, Philadelphia Pa. Active, Philadelphia Branch
Thomas Wallace, Philadelphia, Pa. Active, Philadelphia Branch
William A. Bantle, Camden, N. J. Active, Philadelphia Branch
Robert C. Ledig, Philadelphia, Pa. Active, Philadelphia Branch
Ernest Ohl, Riverside, N. J. Active, Philadelphia Branch
George F. Bieber, Philadelphia, Pa. Associate, Philadelphia Branch
Arthur C. Pearson, Philadelphia, Pa. Associate, Philadelphia Branch
Frank L. Olroyd, Allentown, Pa. Associate, Philadelphia Branch
Alfred R. Harris, Philadelphia, Pa. Associate, Philadelphia Branch
Robert Steurnagel, Jr., 2480 W. Capital Drive, Milwaukee, Wis. Active, Milwaukee Branch
Kenneth P. Kester, 413 Gilmore Ave., Olean, N. Y. Active, Buffalo Branch
Roderick McGhee, 208 Millicent Ave., Buffalo, N. Y. Buffalo Branch
George F. Nowojski, Intern'l Railway Co., Main & Michigan, Buffalo, N. Y. Active, Buffalo Branch
Michael J. Kibler, 78 Mapleridge Ave., Buffalo, N. Y. Buffalo Branch
Lorne Elsmer Davey, 107 Crowley Ave., Buffalo, N. Y. Active, Buffalo Branch
Irving Rosenberg, Kason Hardware Corp., New York City Active, New York Branch
Lester E. Detre, Galv. Supt., Brainard Steel Corp., Warren, Ohio Cleveland Branch
A. L. Spiser, 7600 Euclid Ave., Cleveland, Ohio Cleveland Branch
H. DeGrenier, 1523 N. Hamlin Ave., Chicago, Ill. Active Chicago Branch

DECEASED

Claude A. Terrill, 4123 W. Cherry St., Milwaukee, Wis. Milwaukee Branch

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BOSTON BRANCH'S

Annual Educational Session and Banquet

Feb. 26, '38, Hotel Bradford, Boston

Educational Session 2 p. m. sharp: 2 p. m. New Items in Metal Finishing (This Speaks of Originality Itself)—By Mr. Gustave Klinkenstein. 3 p. m. Something New In Nickel—By Walter Meyer. Delivered as only Walter knows how. 4 p. m. Fundamental Principals of Barrel Plating, or A Practical Demonstration of What Actually Happens in a Plating Barrel under Various Conditions—By Burt Daw. 5 p. m. Welfare. In offering you this Educational Program we feel we have offered you enough reason to come to Boston; but that is not ALL; the evening Entertainment will be Bigger and Better than ever; Fun for All.

BANQUET DANCING FLOOR SHOW
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BANQUET TICKETS $3.00

Special Program for the Ladies during Educational Session. We are looking forward to seeing you in Boston, Feb. 26.

NOTICE!

The Saint Louis Branch of the A. E. S. has postponed indefinitely their proposed banquet of January 22nd.

The Abstract Section

R. M. GOODSELL, *Chairman, Program and Educational Committee*

1. Barrell Finishing of Metal Products: *ARTICLE II.* H. LEROY BEAVER. *Product Finishing*, Dec. 1937, pp. 24-29—Review of discussion on soaps and their application. Hard water due to soluble calcium and magnesium salts which react with soap to form insoluble calcium and magnesium soaps. If this happens during the rinsing operation, this sticky curd will give trouble. Hard water also results in high soap consumption. Long experience leads author to believe that water should not run over 7 grains, without putting in a water softener. Article gives preparation of standard soap solution and its use in testing hardness. Soap bark comes from inner bark of large trees found in Chile. If in chip form, it should be boiled in water first; if in powder form, stir with cold water. It has weak detergent and lubrication value. The soapless soaps are usually sulphonated higher alcohols, etc. These do not hydrolyze to give alkaline reaction. The valuable properties of the soapless soaps are their free rinsing properties, as they do not form curds in hard water. Short discussion of burnishing stainless steel. A No. 1 finish is not satisfactory finish for sheet to be used. Parts cannot be burnished with soap as lubricant. Instead, use 1.5 pounds of Vienna lime for each gallon water used. A cast iron or sheet steel barrel is used. Barrel must be vented due to heat liberated when lime slacks. Running time is from 24-36 hours. PHIL J. RITZENTHALER.

2. Nature of Lapped and Polished Surfaces. FRANCIS W. SHAW. *Machinery*, London, Vol. **50,** June, 1937, pp. 389-392—*Research Report.* Emery, alundum, and carborundum cut at almost the same rate. Carborundum maintains this rate better than alundum and still better than emery. With carborundum, the lap wear is about twice as fast as with emery and with alundum, about 1.25 times as fast. The rate of cutting is almost proportional to pressure. The lap wear is in this ratio: cast Fe 1; mild steel 1.27; Cu 2.62; and, in general, is inversely proportional to Brinell hardness. Copper and steel lap faster than cast Fe, but latter maintains its form better. Wet lapping is from 1.2 to 6.0 times as fast as dry lapping.

PHIL J. RITZENTHALER.

3. Electrical Conductivity of Nickel-Sulfur Electrodeposits. H. KERSTEN and W. T. YOUNG. *J. Applied Physics* 8: Feb. 1937, pp. 133-4—*Original Research.* Nickel and sulfur deposited at same time under special conditions, form an amorphous deposit containing 13% sulfur. On heating to about 170° Centigrade, the electrical resistance decreases suddenly and Laue photographs show that deposits have become crystalline with a structure similar to nickel sulfide reported by Alsen.

PHIL J. RITZENTHALER.

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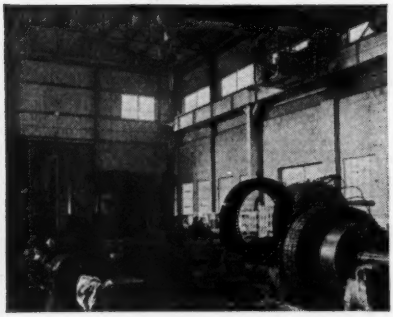

Because of the steadily increasing activity in the electro-plating industry and because the Hanson-Van Winkle-Munning Company, manufacturers of electroplating equipment and supplies, Matawan, N. J., has obtained such a large share of this increased business, a considerable expansion program has been undertaken by the company. A new office building has been built on Church Street, connected with the main office by a bridge. The additional space (approximately 2000 sq. ft., making a total of 10,000 sq. ft. of office space in all) is used as a drafting and engineering room. The second extension within two years has been added to the electrical shop. The building recently constructed is 54 x 72, which, with the first extension of 38 x 54 adds a total of about 6,000 sq. ft. of additional space. A new railroad spur has been built with sunken tracks so that the car floor is on a level with the new concrete loading platform. A 60 ton crane has been erected for loading and unloading heavy equipment. A new electrical sub-station has been installed to take care of the additional load.

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A paper bound, 24-page booklet, 4″ x 6″, contains methods of analyzing plating solutions in practical operation, and as used in the laboratories of the Company. The value of this book can be seen from the Table of Contents which includes the following:

Principles Involved in Analysis: The Use of Apparatus; Methods of Sampling a plating solution; Methods of Analysis of the following solutions: Nickel and Black Nickel (metal, chlorides, pH, sulphocyanide); Silver and Gold (metal free sodium or potassium cyanide); Copper and Brass (metal, sulphuric acid, copper sulphate, free sodium cyanide); Zinc (metal, cyanide, sodium hydroxide, sulphuric acid to be added); Carbonates in Cyanide Solutions; Chromium (chromic acid, sulphate); Tin (metal, sodium hydroxide); Cadmium (metal, sodium hydroxide, total and free cyanide).

A list is given of all the equipment and laboratory solutions necessary for analysis.